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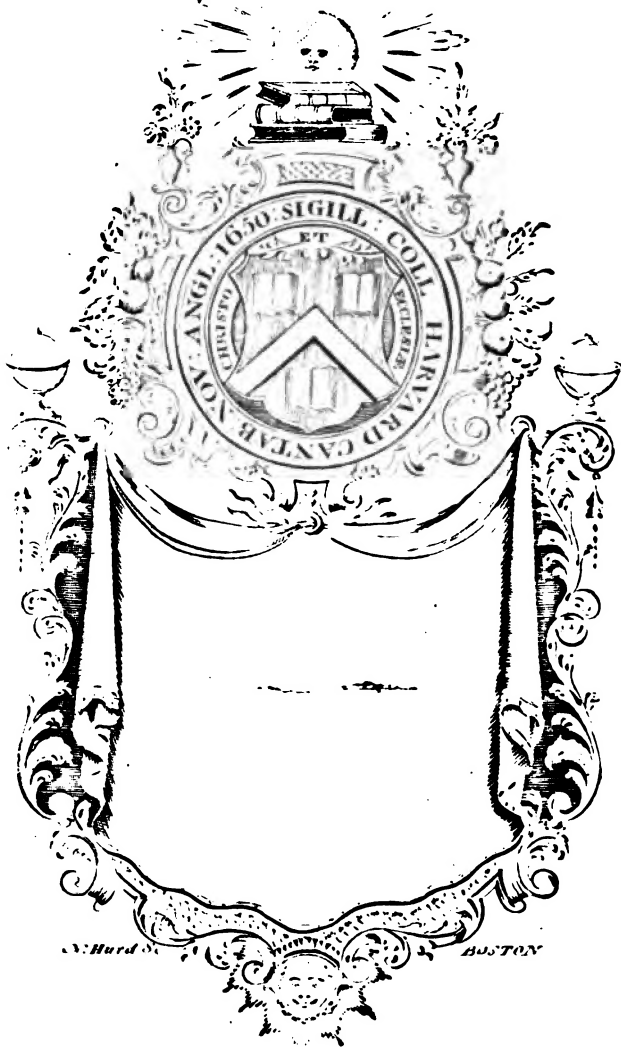
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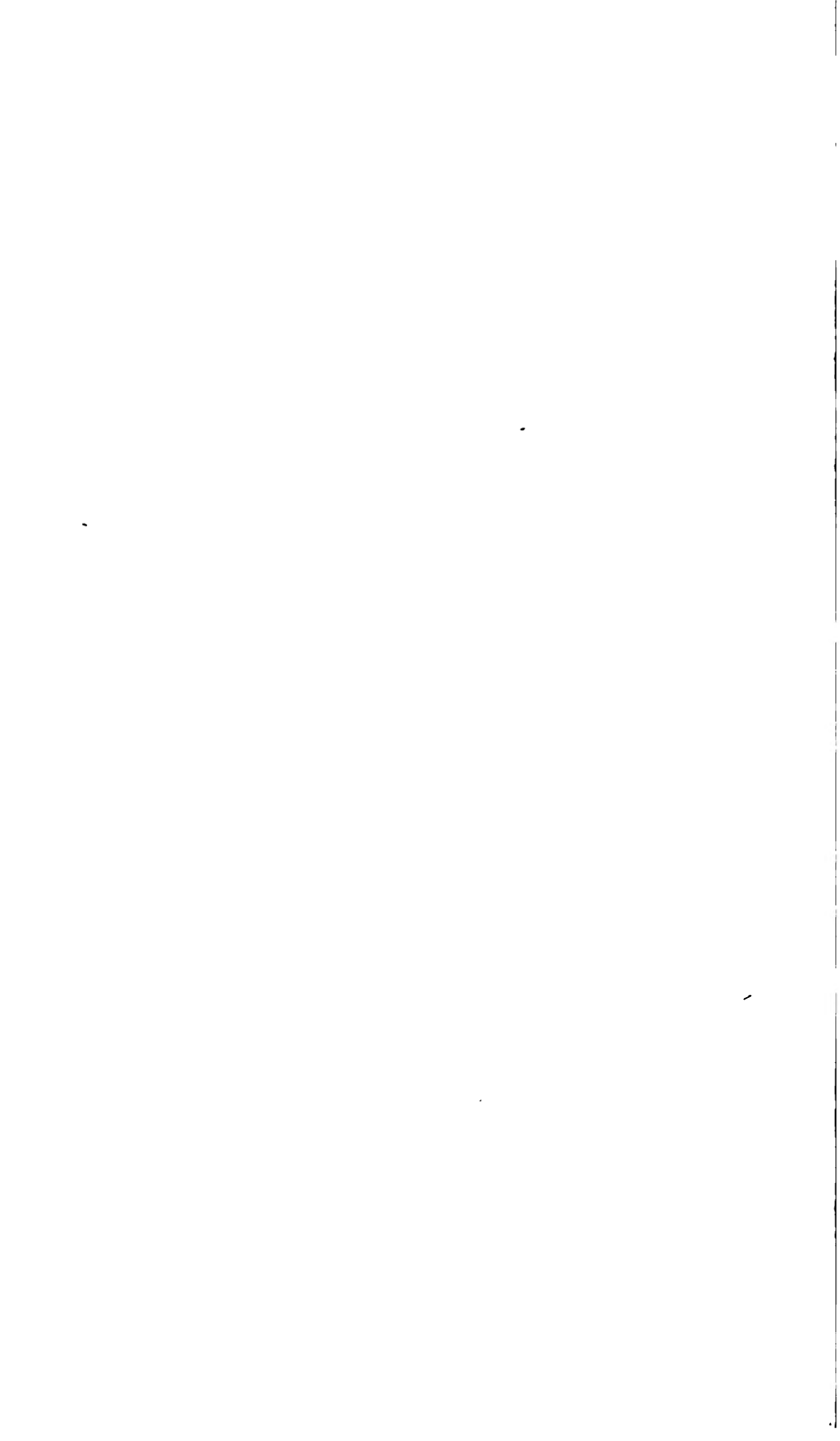
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# *M E M O I R S*

OF THE

L I T E R A R Y

AND

PHILOSOPHICAL SOCIETY.

OF MANCHESTER.

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V O L. III.

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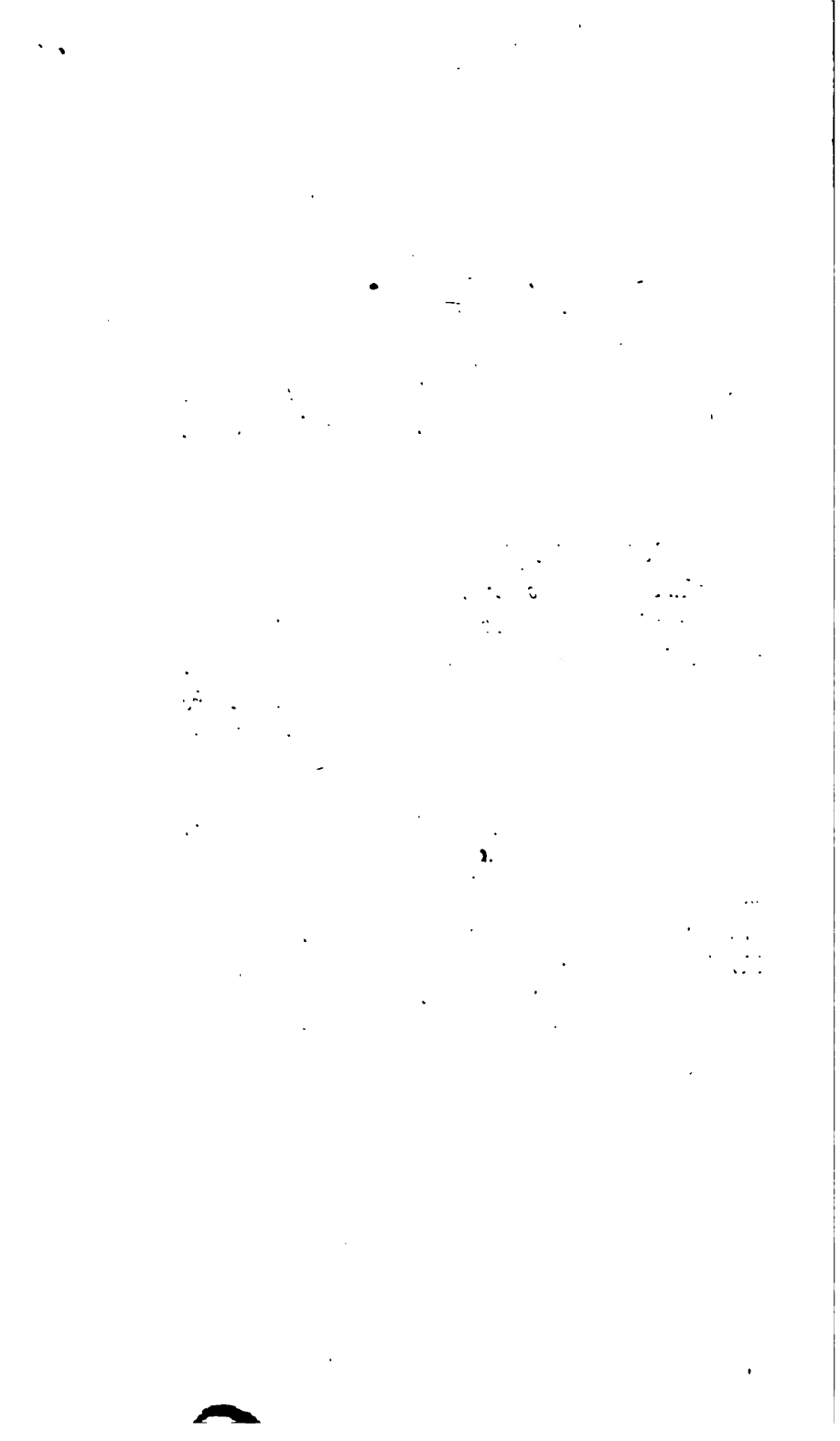
## A D V E R T I S E M E N T.

*THE present volume has been detained an unusual time in the press, partly by the engagements of some of the authors, who have revised their papers for publication; and partly by delays attending the execution of the engravings. The number of materials has likewise rendered this volume larger than either of the former, and consequently lengthened the time of impression.*

*From the institution of the new class of CORRESPONDING Members, the Society may expect an extension of communications; while the method of printing to be pursued in future,\* by furnishing an early circulation of every essay, among literary men, may induce the HONORARY Members, at large, to impart their observations or discoveries still more frequently.*

*The Society must repeat the declaration, prefixed to their first volume, that responsibility for the truth of facts, or justness of opinions, to be found in this volume, rests with their respective authors. To encourage scientific exertions is the grand object of the institution; and the Society gladly acknowledges that the public has treated its endeavours with equal indulgence and favour.*

\* See the Laws annexed.



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## L A W S.

I. **T**HAT the Ordinary Members only shall be invested with the privilege of voting and electing Members; and that the whole expences of the Society shall devolve upon them.

II. That Gentlemen residing at a distance from Manchester, shall be eligible into this Society, under the title of Honorary Members, provided no one be recommended who has not distinguished himself by his literary or philosophical publications.

III. That Gentlemen at a distance, who have favoured the Society with important communications, or from whom such contributions may be expected, shall be eligible, under the title of Corresponding Members.

IV. That every Candidate for admission into the Society, whether as an Ordinary, Honorary or Corresponding Member, shall be proposed by at least three Ordinary Members, who shall sign a certificate of his being, from their knowledge of him, of his character, or his writings, a fit person to be admitted into it; which certificate shall be read at four successive meetings of the Society, previous to the election.

V. That every election shall be conducted by ballot, and that the majority of votes shall decide, thirteen Members at least being present; or a week's previous notice being given, after the fourth reading. That the president shall have the determining voice, if the number of votes be equal.

VI. That when an Ordinary Member removes to a greater distance than twenty miles from Manchester, he may be entitled to the continuance of the privileges of the Society, by paying five guineas to the treasurer, in lieu of his annual subscription.

VII. That a President, four Vice-Presidents, two Secretaries, a Treasurer and a Librarian, be elected annually by the majority of Members present, on the last Friday in the month of April. The election to be determined by ballot.

VIII. That a Committee of Papers shall be appointed by ballot, at the same time, which shall consist of the President, Vice-Presidents, Secretaries, Treasurer and Librarian, together with six other Members of the Society; and that this Committee shall decide by ballot concerning the publication of any Paper which shall have been read before the Society; and shall select, with the consent of the author, detached parts of any Paper, the whole of which may not be deemed proper for publication; but that the presence of seven Members of the Committee shall be necessary for such discussion or decision.

IX. That Visitors may be introduced by any Member to the meetings of the Society, with the permission of the Chairman.

X. That every Member who shall favour the Society with communications, shall send them to one of the Secretaries, the Monday before the meeting of the Society.

XI. That the Secretary to whom the Paper shall be delivered, shall, with the approbation of the President, or two Vice Presidents, have the power of suspending the reading of it until it be referred to a meeting of the Committee of Papers, whose decision shall be final.

XII. That all Papers judged admissible shall be read by one of the Secretaries, or by the author, in their order.

XIII. That no more than half an hour shall be allowed for the reading of any Paper, and if the whole cannot be read within that time, the remainder, except the Society determine otherwise, shall be deferred till the succeeding evening. No Paper however shall



shall engage more than two evenings, without the consent of the Society, expressed by ballot, if required.

XIV. That authors be requested to furnish the Society with an epitome of their Papers, which may be read at the meeting succeeding the reading of each Paper, and the discussion renewed.

XV. That each Ordinary Member shall pay one guinea annually, by half yearly payments, into the hands of the Treasurer, to defray incidental expences, and to establish a fund for the benefit of the Society. Each Member on his election to pay his Subscription for the current half year, together with one guinea admission fee.

XVI. That no Laws shall be enacted, rescinded or altered, but at the quarterly meetings, on the last Fridays in the months of January, April, and October; and that notice shall be given, at least fourteen days previous to those meetings.

XVII. That the Society shall publish a volume of miscellaneous papers, at least every two years. And that at stated times, the Committee shall select from the papers which have been read to the Society, such as shall appear to be most worthy of publication, but that no paper shall be published without the consent of the author. That every paper, voted for publication by the Committee of Papers, shall be sent to the press without delay; that notice of the printing shall be given to the author, and that he be entitled to thirty separate copies, on paying the extraordinary expence attending them.

XVIII. That a Library be formed for the use of the Members of this Society, and that the Librarian be authorized to purchase such books, as shall be ordered at the quarterly meetings of the Society; but that no book shall be taken out of the Library, without leave of the Librarian, limiting the time of keeping it to seven days.

XIX. That the Resolution to establish a Library be announced to the Honorary and Corresponding Members of the Society; and that it be intimated to them by the Secretaries, that donations of their past and future publications will be highly acceptable.

XX. That a gold medal shall be given to the author of the most valuable experimental paper, containing some important discovery relative to the arts and manufactures of Manchester, which shall have been delivered to the Secretaries, and read at the ordinary meeting of the Society, before the last Friday in March 1791.

XXI. That the adjudication of this premium be referred to the Committee of Papers; that their decision shall be made by ballot, and that the medal shall be delivered by the President to the person to whom it shall have been adjudged, or to his representative, at the first meeting of the Society in October 1791.

XXII. That two silver medals shall be given annually, one to the author of the best Essay on a Literary, and another to the best on a Philosophical Subject, which shall have been read at the Society during the course of the season; to be determined by the Committee of Papers.

## A

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# M E M O I R S

## O F T H E

### LITERARY AND PHILOSOPHICAL SOCIETY OF MANCHESTER.

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*An INQUIRY into the PRINCIPLES and LIMITS of  
TAXATION as a Branch of MORAL and POLITICAL  
PHILOSOPHY; by THOMAS PERCIVAL, M. D.  
F. R. S. Lond. and Edinb. Member of the Royal  
Society of Medicine at Paris; of the Royal Soc. of  
Agriculture at Lyons; and of the Philosophical  
Soc. at Philadelphia, &c. &c.\**

MANCHESTER MARCH 24, 1785.

**M**AN has a natural right to life, liberty, and property. Life is the gift of God, and held under his disposal and authority: Liberty is essential to the perfection of a rational, a moral,  
and

\* This little tract was written for discussion in the Literary and Philosophical Society, at a period when taxation was a subject peculiarly interesting to the inhabitants of Manchester, on account of a recent duty on the cotton manufactory; which was afterwards repealed, through the candour and wisdom

VOL. III.

B

of

## 2     *An Inquiry into the Principles of Taxation.*

and an accountable agent : And property results from the exertion of those powers and faculties, which the Deity has bestowed, which duty calls forth into action, and which are necessary to well-being, and even to self-preservation. These several rights involve the lawfulness of their support, and the guilt of their invasion. An attack upon his life or liberty will justify a man, in the defence of them, even to the deprivation of the life or liberty of his enemy. And the invasion of his property will warrant his reprisals on the property of the invader. But the ability of an individual would frequently be inadequate to the defence or protection of his rights ; nor could he judge, with impartiality, concerning the punishment due to the violation of them. In a state of society, therefore, individuals give up to the civil magistrate, as their representative, the right of protection and punishment. This right becomes a public one, and is to be defended by the collective power, and united expence of the community. From these principles flow the duty of allegiance, the authority of laws, and the claims of revenue. To resist the attack of foreign enemies, fleets and

of parliament. It was ballotted for insertion in a former volume of the Society's Memoirs, but was then withdrawn by the author, and has since been revised and enlarged. An Appendix is added, at the end of this volume, containing supplementary notes and illustrations.

armies

armies must be provided; to support domestic peace, to administer distributive justice, and to regulate the police of cities and districts, civil officers of various ranks and denominations are to be maintained and remunerated: And considerable funds will be required for the encouragement of science, the advancement of arts, and the extension of commerce. Thus multiplied and complicated are the just and necessary charges of government.

The *moral obligation* to pay taxes results from the ALLEGIANCE due to the sovereign power, for the PROTECTION which it affords to life, liberty and property; and for the energy which it exerts in the promotion of order, industry, virtue and happiness.

This obligation is common to the subjects of every government; but under the happy constitution of Great Britain, where subsidies are never claimed by the supreme magistrate, without the consent of parliament, we become bound, by a VOLUNTARY COMPACT, made by our delegates, to contribute to the public exigencies, in such proportions, and according to such modes, as they have deliberately enacted.

And, by the refusal to grant such contributions, or by the evasion of them, we not only injure the public weal, but, indirectly, INVADE the PROPERTY of our FELLOW-CITIZENS, who must bear the bur-

#### 4     *An Inquiry into the Principles of Taxation.*

den of additional imposts, in consequence of our contumacious exemption.

The validity of these several obligations is equally clear and forcible. And as man is destined, by his intellectual powers and moral propensities, no less than by his wants and weaknesses, for a state of society, the obligations are not merely voluntary, or of *positive* institution; but, so far as they are essential to that social state, originate in the law of nature, which can be deemed no other than the will of God. Yet, though government, in this sense, is of divine authority, it is so constituted by its adaption to the interests and felicity of its subjects. The rights of the people, therefore, are not only antecedent to, but included in those of the magistrate; and, consequently, there can never subsist a legitimate competition between them. Yet the history of the world is one continued series of such competitions; and experience hath fully evinced, that they have generally sprung from the arrogance, the ambition and the despotism of rulers. To vindicate the sacred and unalienable rights of the people is, in reality, to subserve the true ends of government. A good citizen, under every legal, equitable, and well administered polity, with duty and gratitude, will *render unto Cæsar the things that are Cæsar's*: But the decision, concerning the *things that are Cæsar's*, rests not on the unstable foundation of arbitrary will; and the appeal may, with confidence, be made

made to the principles of reason, of justice, and of patriotism. On these principles, I shall endeavor to explain the limits of the several *moral obligations*, laid down in the three foregoing propositions.\* (A)

I. ALLEGIANCE is due for the PROTECTION of the sovereign power. But protection may be paid for at too high a rate. For, in every convention, a just proportion should be preserved, between the price and the value of the commodity. "If, "to purchase a sword for my defence against a "thief, I must empty my purse, interest will lead "me rather to make a composition with the plunderer; or prudence will dictate some other less "chargeable means of security."† Lord Herbert of Cherbury relates, in his travels through Savoy, that "though the Duke had put extreme taxations "on his people, insomuch that they paid him "not only a certain sum for every horse, cow, ox, "or sheep that they kept; but afterwards for "every chimney; and, finally, every person by "the pole, which amounted to a pistole or fourteen shillings a head or person, yet he wanted "money: At which I did not so much wonder, "as at the patience of his subjects."‡ After the

\* The capitals refer to the notes in the appendix, which is placed at the end of the volume.

† Abbé Raynal.

‡ Life of Lord Herbert.

## 6 *An Inquiry into the Principles of Taxation.*

cruel expulsion of the Moors from Spain, by which that kingdom was deprived of more than half a million of industrious inhabitants, new contributions were imposed on the poor and indolent natives, to supply the unavoidable, though unexpected deficiency of the royal revenue, resulting from that impolitic measure. This fertile country has indeed been desolated by the oppressive laws, and rapacious exactions of its government. The number of the people has been reduced, within the space of a few centuries; from twenty to seven millions; and the produce of corn, formerly furnishing, not only a full supply for internal consumption, but also a large exportation to other parts of Europe, is now insufficient for its own diminished population. Every manufacture, and even necessary of life, is charged with an impost of fourteen *per cent.* on the first, which is repeated on each subsequent, sale.\* Philip II. attempted to lay the same burthen some duty on his subjects in the Netherlands; and the attempt, it is well known, was one principal cause of the glorious revolution, which freed the United Provinces from his tyranny.

Protection may be very unduly or unequally dispensed; and the ordinary benefits of the social union not participated, in any reasonable degree, by the bulk of the community. Great lords may

\* Lord Kaims.



be suffered to tyrannize over their tenants or vassals, whilst the country is, at the same time, made a prison to its inhabitants, by the severest prohibitions of emigration. At the beginning of the sixteenth century, there subsisted, in Russia, no other slaves, except prisoners of war. A new arrangement took place after the conquest of Casan and Astracan. These beautiful and fertile provinces so powerfully attracted the peasantry, that a rigorous law ensued, in 1556, which confined them all to their own glebe. And they were thus at once divested of property and personal liberty.\* Similar revolutions have occurred in the other northern states, and the consequences have been penury, wretchedness, and a degradation of the human species. In France, the tax called the *Taille*, used to be levied on men, who, being without any other property than their necessary utensils, and subsisting solely on their daily wages, could not be compelled to payment, even by violence itself. Every collector, who was constrained to undertake the levy of the tax, had authority to call upon the four persons in the district, whose proportion of the *TAILLE* was the greatest, to fill up all deficiencies; and they were thus forced, by the sale of their effects, or by imprisonment, to expiate the negligence of the collector or the poverty of their neighbors; not-

\* Abbé Raynal.

withstanding they had themselves discharged their own share of the impost.\* In such cases, and in others which might be specified, the principles are subverted, on which the claim to allegiance is founded: And taxes may then be enforced by penalties, but will no longer be paid from any just sense of moral or political duty.

Subsidies may be perverted from their original designation, and applied to the purposes of ambition, oppression, or the establishment of despotic power. This occurred in the reign of James II. and occasioned his expulsion from the kingdom. And in that of Charles I. when ship-money was levied under the delusive and dangerous plea of state-necessity, though England then enjoyed a profound peace with all her neighbors, we venerate the intrepid patriotism of Hampden, for the noble stand he individually made against its exaction. Yet the exaction had been laid with great equality; had been so generally submitted to by the people, as to produce, in 1636, more than two hundred thousand pounds; and had been solemnly authorized by the twelve judges; who, by their servile decision, to use the words of Lord Clarendon, "left no man any thing he might call his own."

II. But it may be alleged that the opposition of Hampden was chiefly grounded on the *illegality*

\* Life of Turgot by the Marquis de Condorcet.

of ship-money, as subjecting the people to the arbitrary will of the prince; and that a TAX GRANTED BY PARLIAMENT is a solemn and VOLUNTARY COMPACT, between the PEOPLE, and their SOVEREIGN, binding the former, in all cases whatsoever. This position implies the lower house of parliament to have been legally and constitutionally chosen, and not like the packed assemblies in the reigns of Richard II. and James II. In the former, the sheriffs were commanded to suffer none to be returned, as knights or burgessees, but such as the king's council should nominate.\* And, in the latter, the illicit practices employed in election produced complaints from every part of England. Yet so successful were the arts of the court, that James exulted in there being only forty members, who were not entirely devoted to his interest.† Admitting, however, the regular election of our representatives, a little consideration will evince, that the trust which is delegated can never be unconditional; and that the powers vested in them may lose the force of moral obligation, by palpable abuse and unrelenting perversion. Fear, self-interest, ignorance, or corruption may predominate in their deliberations, and prevail with them to sacrifice the dearest interests of those, by whom they are commissioned. In the reign of

\* Parliamentary History.

† Burnet.

Henry VIII. the parliament resigned both their civil and ecclesiastical liberties to the king, and, by one act, totally subverted the English constitution. For they gave to the king's proclamations the full force of a legal statute; and even framed the law, as if it were merely declarative, and intended only to explain the true extent of the regal prerogative.\* When the same arbitrary monarch heard that the commons made a difficulty of granting a certain supply, which he required, he was so provoked, as to send for Edward Montague, a member who had considerable influence in the house; and laying his hand on the head of that gentleman, then on his knees before him, imperiously said, *get my bill passed by to-morrow, or to-morrow this head of yours shall be off.* His despotism too well succeeded; for, the next day, the bill was passed.† Under the government of Edward VI. a grievous and partial tax was imposed on the whole stock and moneyed interest in the kingdom, with an *entire exemption of the land.* One shilling in the pound was to be levied yearly on every person who possessed ten pounds, or upwards; a sum equal to half the yearly income of all money-holders, according to the rate of legal interest.‡

\* Hume, vol. IV. p. 210.

† See Collins's British Peerage. Hume, vol. IV. p. 51.

‡ Hume, vol. IV. p. 346.

In the year 1660 a perpetual excise on ale, beer, &c. was enacted, by parliament, as a *commutation* with Charles II. for the abolition of the court of wards and liveries. This court was an intolerable oppression on the nobility and gentry; as the king exercised by it the wardship of all infant heirs; and enjoyed the benefit of their estates, till they had attained a legal majority. He had, also, the absolute disposal both of male and female heirs in marriage, with other powers liable to great abuse. But it is evident that these feudal services affected solely the proprietors of land; whereas the excise must fall chiefly on the lower tenantry, and laboring poor; and that, therefore, the alleged commutation was, in a considerable degree, founded in fraud and injustice. In this light it appeared to some of the members of the house of commons: Mr. Annesley, in particular, urged, "that if the bill  
" was carried (which it was afterwards by a majority  
" of two voices only) every man who earns his bread  
" by the sweat of his brow must pay excise, to excuse  
" the court of wards, which would be a greater  
" grievance upon all, than the court of wards was  
" to a few."\*

There is on record a solemn resolution, which passed in a committee of the house of commons April 6, 1780, when no less than four hundred

\* See Harris's Life of Charles II. vol. I. p. 396. Parliamentary History, vol. XXIII. p. 21.

and forty-eight members were present, that the influence of the crown *has increased, is increasing, and ought to be diminished.* (B) And in the statute of a subsequent session of parliament, for regulating the king's household, it is enacted, that an oath be taken by the keeper of his majesty's privy purse, that no part of it shall be applied to the use of any member of the house of commons. We are further warranted, in our apprehensions of the danger arising from this source, by the authority of the Baron de Montesquieu, who predicts that the liberties of England will perish, whenever the legislative power shall have become more corrupt than the executive: or, as it should, perhaps, have been expressed, whenever the executive power shall have acquired a corrupt ascendancy over the legislative. In the reign of Charles II. if the dispatches of Barillon may be credited, the king of France meditated the establishment of a pecuniary influence in the English Parliament. It is also well known that Charles was himself a pensioner to this monarch, and received large sums for the most illicit purposes. When the crown egregiously abuses its power, the commons, on various occasions, have thought themselves justifiable in withholding the supplies. If they, however, unhappily countenance and aid such abuses, and remain deaf to petitions, remonstrances, and every other constitutional claim, the people may continue to submit, but cannot deem themselves

*morally*

*morally* bound by their acts: And Britons would then lose the glory, which Plato ascribed to the citizens of Athens, of being at once the masters and slaves of the laws.

The division of the sovereignty of these realms into three estates, which, acting in concert, we denominate parliament, by reciprocal checks, and reciprocal aids, gives our civil polity advantages enjoyed by no other in Europe. Yet it was an apophthegm of the great Lord Treasurer Burleigh that England could never be ruined but by a parliament.\* And the doctrine of its omnipotence, which succeeded that of the divine and indefeasible right of our kings, has contributed to the loss of America, as well as to the separation of Ireland; and may, hereafter, prove subversive of our liberties. For with the specious observance of every form of our constitution, the essence of it may be annihilated; as occurred at Rome, under the despotism of Augustus: For the senate retained themselves the image of freedom, whilst they gave a full sanction to his usurpation. Indeed corporate bodies, when they affect unlimited power, are capable of proceeding to greater lengths than any individual.

Supreme authority is perfectly distinct from arbitrary or absolute power. The one is founded on certain fundamental principles, and limited by

\* Blackstone.

certain constitutional restrictions; whilst the other is unconditional, and without all rational control. A just government is obliged to the most scrupulous attention to the original ends of its institution. Nor can even wise and legitimate *ends* be pursued by *means* inconsistent with equity, because no policy can ever supersede the laws of morality. And this rather dignifies, than derogates from, sovereign dominion. For the Deity himself is bounded, in the exercise of power, not only by physical impossibilities, but by the rectitude of his divine nature.

Compulsion has been said to be the essence of government.\* But, I apprehend, *compulsion* is here mistaken for *a power to compel*; otherwise, there can be no distinction between government and tyranny. The former is instituted for the public weal, and, when so administered as to promote its salutary ends, will have the confidence, the respect, and the *voluntary* obedience of a great majority of its members. Whereas the latter, according to a recent definition of eastern despotism, regards "the sovereign as possessed of *all*, and the people of *no* rights." It exacts what a wise man cannot freely give, and commands what a good man ought not to perform. "The state of every king," says the preamble to one of our acts of parliament, "consists more assuredly

\* Soame Jenyns.



“in the love of the subjects towards their prince, than in the dread of laws made with rigorous pains.”\* But the love of the subject can alone be secured by a full conviction that the supreme magistracy is cordially interested in his prosperity and happiness. And this is best evinced by a reluctance to impose unnecessary burthens; by equity and impartiality in the assessment and collection of them, and by a readiness to participate in the sacrifice of private interest to public good. The Roman emperor, Marcus Aurelius, sold the furniture of the imperial palace, together with his own vestments, and those of the empress, rather than levy a new tax on the people!†

III. In support of the moral obligation to pay taxes, it is justly urged, that by our refusal to grant such contributions, we not only injure the commonwealth, but cast upon others that debt, which we ought to discharge ourselves. A venerable philosopher has, in a very apposite manner, illustrated this argument, by the following analogy. “What should we think of a companion, who having supped with his friends at a tavern, and partaken equally of the joys of the evening with the rest of us, would nevertheless contrive, by some artifice, to shift his

\* See Blackstone's Commentaries, vol. IV. p. 17.

† Aul. Gell.

“share

" share of the reckoning upon others, to go scot  
 " free ? If a man, who practised this, would,  
 " when detected, be deemed and called a scoun-  
 " drel, what ought he to be called, who can  
 " enjoy all the inestimable benefits of public  
 " society, and yet contrive to evade paying his  
 " just share of the expence, and wrongfully throw  
 " it upon his honest, and, perhaps, poorer  
 " neighbors ?" \* But suppose the share to be  
 unjust, or partially demanded ; is the imposition  
 to be submitted to without complaint or remon-  
 strance ? The plea of equity, which authorizes  
 one to withhold a public subsidy, if well founded,  
 must be clearly discernible by the understand-  
 ing of his neighbor, and ought alike to direct  
 his conduct. Should he, therefore, through the  
 want of patriotism, or the fear of penalty, acquiesce  
 in oppression, he deservedly incurs both the blame  
 and the suffering. Mr. Hampden withstood the  
 assessment of ship-money, in opposition to the un-  
 animous opinion of the twelve judges ; and in  
 vindication of the unalienable rights of his fellow-  
 subjects, exposed himself, for the trifling sum of  
 twenty shillings, to the indignation, and rigorous  
 persecution of the court.

I am sensible that pride, resentment, faction,  
 and self-interest set themselves in opposition to the  
 state ; and, that men, so actuated, may falsely

\* Franklin's Political and Miscellaneous Pieces, p. 69.  
 assume

assume the motives and principles of the conscientious and the good. Penalties, therefore, are wisely annexed to the infringement of the laws of revenue: And authority is properly exerted in the ordinary course of government, to awe the refractory into submission. But it must still rest with the people, ultimately, to decide concerning the moral force of that obligation to pay any particular tax, which is antecedent to the penalty incurred by disobedience; because such decision can be referred to no other tribunal, without the most egregious solecism. And, where can the case be shewn, in which the judgment and determination of the many hath not received its commencement in the judgment and determination of the few, and even of an individual? The right, therefore, must be admitted to subsist in both; though the exercise of it can only be justified on extraordinary occasions. (c) Nor can danger be apprehended to a well governed society from this doctrine. For oppression must be manifest and heavy, before it will be generally resisted; and partial offences, unsupported by public opinion, will be readily prevented by a vigilant police, or compensated by pecuniary mulcts. The refusal of Mr. Townsend, a very respectable magistrate in London, to pay his assessment to the land-tax, is within the memory of every gentleman present. He grounded this refusal on the arbitrary proceedings of the

Vol. III. C house

house of commons, relative to the Middlesex election; and the consequent illegality of an imposition, levied on a county in which the people were not duly represented. His conduct, on this occasion, was influenced by no sordid motives, and proceeded solely from a patriotic zeal to secure the rights of election. Yet a jury of Middlesex men gave a verdict against him, without scruple or hesitation. And their decision was reasonable and proper, because the bonds of the state are not to be rashly loosened by every temporary error or misconduct of statesmen. Candid allowances will and ought to be made for the passions, prejudices, and imperfections incident to our governors, provided their general conduct evinces wisdom and rectitude. Indeed there is so much veneration for power, so great a fear of present suffering, and such habitual regard to the forms of civil jurisdiction in the bulk of the people, that maxims of passive obedience are not necessary to their subjection; whilst they are highly injurious to their rulers; of which the history of the Stuarts affords the fullest evidence. (D) For the temptations to abuse power are, at all times, greater than those of opposition to it; and the abuse is attended with more permanent evils to society. An equitable and well established legislature can, therefore, be under no necessity of inflicting heavy penalties on breaches of the laws of revenue;

revenue ; and punishments of a different nature are seldom, if ever, to be justified. We read, with horror, that in the empire of Japan, death is inflicted on the smuggler. And our sentiments of equity and humanity are almost equally shocked with the account given by M. Necker, that more than three hundred men, of the province of Bretagne alone, are annually consigned to slavery in the galleys of France, for carrying on an illicit commerce in the two articles of salt and tobacco. The truth is, this political crime makes little impression on the moral feelings of the mind, till its nature, extent and consequences have been examined and recognized by reason. And to such investigation the generality of men have neither leisure nor ability to apply themselves. Turpitude in human actions is marked either by the gross defect of good principles, or the prevalence of bad ones. Fraud, dishonesty, perfidy, and cruelty necessarily involve in them a consciousness of guilt ; and, therefore, indicate a mind devoid of rectitude, or overborne by the predominance of malignant passions. But the retention of what is the acknowledged property of the individual, before it is claimed by the state, though, at all times culpable, and deserving of punishment, in ordinary cases, when the nature of the obligation is not sufficiently understood, implies no high degree of criminality.

lity.\* And he, who avails himself, without the scruples which he ought to feel, of the carelessness or mistake of a tax-gatherer, to evade the proportional payment exacted from his neighbors, would blush to take advantage of the tradesman, who, by similar carelessness or mistake, hath omitted, in his bill, some part of the debt which is owing to him. But, when invasion threatens a country, or public calamity calls forth the exertions of every member of the state, the sentiments of the mind being reversed, breach of allegiance, under such circumstances, would be deemed almost equal to the crime of parricide. We may illustrate this observation by a case in military service, with respect to our feelings, somewhat parallel. No one, but the officer on guard, would punish the *sleeping sentinel* with severity, during the season of peace. But, on some critical and very important conjuncture, in time of war, the same offence would merit death, in the estimation of the most humane spectator. To establish a scale of crimes, with exact precision, so as to assign to each its due degree of punishment, is beyond the extent of human ability; and can be accomplished only by the omniscient Searcher of hearts. But the penal

\* On this subject consult Montesquieu, Beccaria, Blackstone, Lord Kaims, Dr. Adam Smith, &c.

laws of government should be founded on a like discrimination, so far as it is practicable, clear, and obvious; and, in all doubtful cases, should incline more to mildness than severity. For it is justly observed, in the preamble of the statute before referred to, "that laws, made for the preservation of the commonwealth, without great penalties, are more often obeyed and kept, than laws made with extreme punishments."

I have thus endeavored, with great brevity, to trace the origin, to explain the principles, and to determine the extent of a duty, which, though essential to the being of society, and of equal importance to the governors and governed, in every community, has not hitherto, I believe, received a specific denomination in any language. Nothing tends more to the establishment of just authority, than the free and temperate investigation of the reasons on which it is founded. And, from what has been advanced, I presume, it may be inferred, that a *tax* can be of no *moral obligation*, when the claim to allegiance is absolutely forfeited; that it is of *imperfect* obligation from mere general allegiance; and that, to give it *full and complete* validity, it should be A LEVY MADE ON THE COMMUNITY, BY LAWFUL AUTHORITY; ACCORDING TO PRESCRIBED FORMS; IN AN EQUITABLE MODE AND PROPORTION; and FOR THE PUBLIC WEAL.

In Britain, the **LAWFUL AUTHORITY**, competent to impose a subsidy, can only be that of the king, lords, and commons, in parliament assembled. The king is representative of the majesty of the people; from them he derives his dignity; to their deputies, his ministers and counsellors are amenable; and his prerogatives\* consist only in a discretionary power of doing good. And, if the regal office be a delegation, the peerage, which flows from it, must participate of its nature. The three estates, therefore, though in different modes of trust, severally and collectively, act in behalf of, and are virtually responsible to the community; who possess, and frequently exercise, towards each of them, the right of petition and remonstrance. But much circumspection is required in applying practically the ideas of **REPRESENTATION** to the regal and aristocratical branches of our constitution. These indeed are delegates, but in a qualified sense; and should be resorted to only, in this view, on pressing emergencies. For the commons are the deputed guardians of the people's rights; commissioned, by them, to act according to, and to express their united suffrage; and renewing their trust and accountability, on every successive election. It is derogatory, therefore, of their importance and dignity, and

\* Locke, Blackstone,



must tend to diminish their due weight in the scale of government, to transfer the peculiar functions with which they are invested to the peers, or to the throne. (E)

Of the FORMS prescribed in passing a money bill, the most essential to its moral validity, because most interesting to the liberty of the subject, is, that it should originate solely in the house of commons. For the lords, being a permanent, hereditary body, created at pleasure by the king, are supposed to be more liable to be influenced by the crown; and, when once influenced, to continue so, than the commons, who are freely elected, and only for a limited time, by the people.\* This privilege forms the great constitutional check on the executive branch of administration; and every good citizen should watch over it with unremitting and jealous attention; extending his diligent and patriotic observation even to turnpikes, parish-rates, and imposts collected, not for the exigencies of government alone, but for private and local benefit.

TO APPORTION the taxes, with all possible IMPARTIALITY, is essential to their having the full force of moral obligation. Yet this is the most arduous office of the financier; and, when a kingdom is under the pressure of accumulated

\* Blackstone.

debts, can, perhaps, be accomplished only by such a modification of the whole system of revenue, as shall compensate the unavoidable excesses in some cases, by equitable exemptions in others. Imposts on articles of provision have often been so improvidently laid, as to occasion great distress amongst the poor. And, as they are the chief consumers, because the most numerous order of the state, the disproportion, attending such exactions, is an injustice equal to the cruelty of the exactions themselves. "Previous to all the laws of society, man had a right to subsist. And is he to lose that right by the establishment of laws? To sell the produce of the earth to the people, at an exorbitant price, is, in reality, to deprive them of it. To wrest from them, by a tax, the natural means of preserving life, is to affect the very principle of their existence."\* But I would not be understood to object to the imposition of moderate duties on the necessaries of life. When judiciously planned, and gradually laid on articles which are cheap and plentiful, they promote industry, ingenuity and sobriety; and are paid cheerfully, because imperceptibly, as they are confounded with the value of the commodity itself. (F) During the imposts of the Sforzas on the harvests and markets of the Piedmontese, the skill

\* Abbé Raynal.

and enterprising spirit of that people were roused to the highest exertion; and their fabrics of silk and cotton were then worked with such elegance and expedition, by the invention of machinery, as precluded all competition. The gentlemen engaged in the manufactures of Manchester will find these observations perfectly consonant to their own experience; yet they are of dangerous tendency, and admissible only within certain restrictions. For both art and activity are not only bounded in their extent, but are precarious in their duration, and dependent on a variety of unforeseen contingencies. And, though the moderate pressure of wants, which may be gratified without much difficulty, stimulates to exertion; yet, necessity creates despair, the parent of idleness, profligacy, and misery. Under such circumstances, the productive laborers of the state will be considerably diminished in number, and will be compelled to raise the price of industry to a height subversive both of trade and commerce. It must be remembered, also, that these working members are incident to the severity of seasons, as well as to the fluctuation and instability of those manual arts which depend on fashion, local conveniencies, or foreign materials; and that they are often plunged into sufferings which call for public aid, and ought to supersede exaction. Besides, there is at all times, and in every place a numerous class of poor, who,

who, from a want of skill, of health, and of that energy which originates from the united powers of nature and education, are barely qualified to earn, from day to day, a scanty subsistence. Yet these are, equally with ourselves, the commoners of the earth; and have a just claim to some portion of the good things of life. May we not also add, that there must be *bewers of wood* and *drawers of water*; and, that to execute the meanest and most subordinate offices is essential to complete the aggregate of human industry and happiness. A wise polity, therefore, will not, by a rigid system of finance, promote the extinction of such men, but will treat them with proper indulgence, will encourage their marriages, and, by well planned institutions, render their posterity virtuous, active, and useful citizens. The penury and depopulation of Spain have been proved, by Ustariz, to arise, not from emigrations to America and the West Indies, but from the oppressive laws of revenue which prevail in that country. When Lord Molesworth resided in Denmark, the collectors of the poll-tax were obliged to accept of old feather-beds and other necessaries, instead of money, from the inhabitants of a town, which once raised 200,000 rix-dollars for Christian IV. on twenty-four hours' notice. In Holland, manufactures have long been in a declining state. It has been calculated, that one third of every man's in-

come

come is paid in subsidies. Bread, I am informed, is taxed at from twelve to fifteen *per cent.* and in towns much higher; malt liquor at fifteen *per cent.* and butchers' meat at twenty *per cent.* Nothing could counteract such heavy duties, on the lower orders of the people, but the extreme frugality and persevering industry, which characterize the inhabitants of the United Provinces.

The EQUITY of an impost; and, consequently, its moral validity, is very materially affected by the MODE of ASSESSMENT. For the time expended, the vexation occasioned, and the indignity sustained by it may be equivalent to a manifold, and, therefore, disproportional payment. Hearth-money, which was granted to Charles II. his heirs and successors, for ever, was abrogated, in the year 1688, by an act of William and Mary; of which the following is the preamble, "That it  
" it is not only a great oppression upon the poorer  
" sort, but a badge of slavery upon the whole people;  
" exposing every man's house to be entered  
" into, and searched, at pleasure, by persons unknown to him."\* The excise, from its first institution to the present time, has been odious to the people of England. It extends to a very numerous detail of commodities, the list of which, says Sir William Blackstone, no friend to his

\* Lord Kaimes's Sketches, vol. II. p. 354.

country would wish to see farther increased. Yet it has been greatly increased since the time of this excellent judge, and, I believe, with additional vexations and severities. The officers, concerned in this branch of revenue, are authorized to enter and to search the houses of persons, who deal in excisable articles, at all hours of the day, and in many cases, of the night also. And the proceedings, under suspicion of transgression, are so summary and sudden, that, in a very short space of time, a man may be convicted in the penalty of many thousand pounds, by two commissioners, or justices of the peace, or even by the same number of magistrates, in the smallest corporate town, to the total exclusion of the trial by jury, and without regard to the common law of the land.\*

This mode of assessment might, perhaps, be rendered more consonant to the principles of British liberty, and to the ordinary proceedings of legal administration. There seems to be no sufficient reason for the exclusion of a jury, nor for deciding in a way so unusually sudden and summary. Appeals, also, should be admissible, in all cases, to the quarter sessions, or to some public and respectable tribunal. And the persons prosecuted should be allowed counsel for their defence, together with full costs of suit, and even damages, if judgment

\* See Blackstone, Burn's Justice of the Peace, &c.

be awarded in their favor. Nor does it seem equitable, provided no perjury has been practised, nor malignant intention manifested, that, when the plaintiff is non-suited, the officer of revenue should recover treble costs. These alterations in the statutes of excise would not occasion any delay, of consequence, to the revenue; and they might obviate abuses, which, by creating murmurs and discontent, diminish the veneration due to the laws. (G)

In the Highlands of Scotland, it is said by Lord Kaim, that the excise upon ale and spirits defrays not the salaries of the officers, who levy it. The people, therefore, are burthened with a contribution, which adds to the expence of government, and withdraws from useful labor many industrious hands. This last consideration seldom enters into the estimate of the financier: Yet the magnitude of it will be apparent from the late observations of M. Neckar, who computes that the tax-gatherers in France amount to two hundred and fifty thousand persons; thirty-five thousand of whom devote their whole time to the business. The enforcement of imposts by oaths may be supposed rather to increase, than to diminish their moral validity. Yet it is a practice that, on trivial occasions, seems to participate of impiety; and, on all occasions, is conducted with so much carelessness and irreverence, as tends to the most pernicious consequences. A million  
of

of perjuries are supposed, by a very able calculator, to be annually committed in this kingdom.\* (H)

In the definition of a tax, which has the full force of a moral obligation, it has been laid down, as its ultimate and most important constituent, that it is a levy made for the public good. And it is the special duty of the supreme power to keep this sacred end in view, in the exaction of every subsidy. The confidence and veneration of the people would thus be secured; and a respectful submission would be paid even to the errors of government, as unavoidable consequences of human frailty; and as only temporary grievances, which better information would redress. In the application also of the national funds, the like rigid attention to wisdom and rectitude should be uniformly maintained. How often has it been urged to me, says M. Necker, can you refuse to ask the king for a thousand crowns, to relieve such a person whose misfortunes are known to you. Will the royal exchequer be the poorer for it? Forget, I have replied, this royal exchequer, which you consider only as an accumulated mass of money, without having examined its source: A thousand crowns are the amount of the land-tax of two villages; and I leave you to judge whether the person for whom you solicit has a just claim to the labor and contributions of their inhabitants.

\* Price on the American revolution, p. 82.



It is a violation (observes the same honest financier, in another part of his work, with which I shall now conclude)—It is a violation of the most sacred of all deposits, to employ the sacrifices of a whole nation in inconsiderate prodigalities, useless expences, and undertakings foreign to the good of the state.

N. B. *The enlargement of this essay, has occasioned supernumerary pages, which the printer has distinguished by crotchets. An Appendix, containing notes and illustrations, is inserted at the end of the volume.*

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Of POPULAR ILLUSIONS, *and particularly of* MEDICAL DEMONOLGY. *By* JOHN FERRIAR, M.D.

The earth has bubbles, as the water has,  
And these are of them.

SHAKESPEARE.

READ MAY 12, 1786.

**T**HERE are two classes of readers, who will probably expect little entertainment from the subject of this essay; those who are not acquainted with it as a branch of literature, will think it an idle task

task to attack the forgotten follies of the nursery; those who know the number, the ingenuity and importance of writers in this controversy, may suppose that little can be added to their labours. To the first I acknowledge, that we should hardly expect that extravagant conceptions, frequently originating in the imbecility of obscure and frantic individuals, should interest political as well as literary bodies, should be defended and supported with the most turbulent clamours, and should sometimes endanger the safety and order of society; yet such have been the effects of popular illusions; some of them indeed so extraordinary, that nothing but the occurrence of similar events in our own times could gain them belief. These facts constitute a curious part of the history of human reason, and every where obtrude themselves in medical researches, yet I believe the subject is in general misapprehended, and errors are imputed to ignorance, which, however they arose, were supported in the most enlightened times, and by writers of the greatest knowledge and acuteness. A proper attention to some facts separated from the great mass (for I dare not undertake a complete history) will convince us, that such insatiations are not always to be ascribed to the occasional workings of distempered minds, but to the general persuasion of the most intelligent; and that they derive their origin from the abuse of tendencies imparted for better purposes.

Ignorance

Ignorance and fear are generally said to produce the first superstitions of uncivilized men; and they indeed assist each other powerfully. The mind seems to magnify the object of its terror in proportion to its ignorance of the properties of that object. But a cause equally active with these, which operates both in the rude and polished states of society, is the restless curiosity we derive from our constitution respecting the causes of natural phenomena. Man, in the savage state, is melancholy and reserved; constantly exposed to toils, and frequently to dangers, he associates the ideas of hostility or protection even with inanimate objects; unacquainted with the relations of cause and effect, he judges chiefly from those of resemblance; every storm is supposed to be directed by an enemy, similar to the human adversary, but superior both in powers of opposition and concealment: the rock, or the tree which shelters him from the weather, or saves him from the pursuit of a wild beast, becomes first a patron, and then a divinity. Accordingly, the delusion of incantation was long supported in Germany, because the peasants could not account for the appearance of hail-storms in summer, but from the operations of witches\*; and the deification of ancient heroes and legislators can only be explained on the principles of gratitude and veneration, which led their people to hope that their benefactors continued to

\* Wier. Lib. Apologet.

behold and protect them, after death, though heightened in their powers, and changed in their mode of existence. In certain states of man, respect and adoration are simultaneous; the Egyptians worshipped different animals and vegetables; the Athenians considered the posts before their houses as gods\*; the Romans deified their military standards†, and erected a temple for their reception at every permanent station(A). Shakespeare touches this disposition finely, when Caliban worships the person who first gives him a draught of wine;

I'll shew thee ev'ry fertile inch o' the isle,  
And I will kiss thy foot: I pri'thee be my god.

It is remarkable, that the propensity to ascribe the powers of animated to inanimate beings, is the foundation of poetry; and what betrays men, in one stage of society, to the lowest absurdity, becomes, in another, the source of their most elegant pleasure.

An attention to dreams and omens is one of the first acts of superstition, and evidently derived from the associations already mentioned. Not only the civil magistrates and military commanders, but philosophers, in the brightest periods of Greece and Rome, were enslaved by this observance. Pythagoras and Plato, says Cicero‡, to increase the certainty of dreams, direct certain forms and diet pre-

\* Plutarch in Alcibiad.  
tom. IV.

† Montfaucon L<sup>r</sup> Ant<sup>r</sup> Expl.  
‡ De Divinat, lib. II.

paratory to sleep. Socrates predicted, while in prison, that he should die within three days, because he dreamt that a person repeated to him that verse of Homer, "on the third day thou shalt arrive at the fertile Phthia." Aristotle wrote expressly on this species of Divination (b). Zeno, Cleanthes, Chrysippus, Babylonius Diogenes, Antipater and Posidonius, are enumerated by Cicero, as writers on this subject. That the auspices were employed with a political design there can be no doubt, and their utility was fully experienced in the assemblies of the people: they were likewise very serviceable in promoting discipline in the armies. The attention of the ancients to omens, in their military expeditions, was minute and constant, nor could any neglect of them be easily forgiven. The loss of the Roman fleet, under Claudius Pulcher, was generally attributed to his having drowned the holy chickens (c), and the death of Marcellus was imputed to his neglect of the omens which forbid his advancing against the enemy\*. Instances of this kind occur in every page of ancient history, let us take one for all. When the Athenian fleet was just quitting the harbour, to attack the Corcyrians, the pilot happened to hear one of the rowers sneeze, by which he was so much intimidated, that he ordered the signal to be given for returning to their station, as if they had weighed anchor inauspiciously; and

\* Cic. and Plutarch.

they would have returned to their anchorage, if the admiral, Timotheus, had not suddenly exclaimed, do you wonder that of so many thousands, one man should be troubled with a defluxion\*?

It is a striking circumstance in the character of Pompey, that while he was disputing the empire of the world with his great rival, he collected auspices from all quarters†, confiding in their truth. It appears that the augurs knew how to make their predictions agreeable, for Cicero says that every thing happened contrary to them; *omnia fere contra ac dicta evenisse* (D).

We may indulge our curiosity in remarking, how nearly the most polished nations of antiquity, in these superstitions, approach the Indian tribes of North America. All the marches of the Indians are regulated by the dreams of the old warriors, who, under this pretence, often convey information gained by spies to the young men: but it must be observed that they only pay attention to dreamers of established character. They have their regular diviners, or conjurers also, who are at the same time physicians. When a disease proves mortal, the doctor is frequently in danger from the resentment of the patient's friends: from this risk, the progress of refinement has happily exempted the physicians of Europe. In every Indian village, the war-woman also is a kind of oracle; by dreams and presages,

\* Frontin. Strat. lib. II.

† Cic de Divin. lib. II.

she directs the hunters to their prey, and the warriors to the enemy, and is rewarded with a share of the spoils; but the unhappy female who aspires to this dignity, and whose presages are fallacious, (for there are frequently rivals) never escapes without a severe beating. These circumstances recall to the mind Cæsar's account of the ancient Germans, and they are not the only ones in which the Indians strongly resemble the Celts.

A persuasion so general and so permanent must depend on associations not more remote than those enumerated, but when we trace it, through the vicissitudes of governments, and alterations of manners, to the very close of the last century; when we discover that some of the first men in rank and abilities, of so late a period, supported it, and that sober and learned writers have defended it a few years back, we must admit the influence of long-established custom, and the dignity of antiquity to have powerfully assisted this delusion. Artifice and credulity have also conspired to its permanency; and the Astrological physicians, founding their opinions on some phænomena in the course of diseases, which later observations seem to extend\*, had their full share in this operation. Cardan was one of the most celebrated medical astrologers, and boasts with much satisfaction, that on being informed of the symptoms for which Hamilton, Archbishop of St.

\* See Dr. Balfour's Obs.

Andrews, wished to consult him, he declared without hesitation the exact situation of the planets at his nativity, which he afterwards verified, by calculating his horoscope. Several historians relate that after curing the Archbishop, he foretold the manner of his death; but the truth of this assertion is extremely doubtful, for Cardan, who was not disposed to conceal his own excellence, would not have failed to boast of so extraordinary a circumstance, yet we find no trace of the prediction in his works, though he published Hamilton's Horoscope, among others, with a commentary. Porta and Fernelius followed Cardan in combining medicine with astrology. Paracelsus, by supposing a spirit derived from some constellation to reside in every human being, rendered the connection still more intimate. Severinus and Hartmann followed his opinions. Horstius believed not only that certain conjunctions of the stars produce epidemics, but that evil aspects produce miasmata\*. The grave and sagacious Lommius supposes that the appearance of comets presages the plague†.

At length, the Cartesian Philosophy produced inquiries that terminated in more rational conclusions respecting medicine; the influence of some of the planetary bodies on the human frame was allowed, as far as they could be supposed to affect the state of the atmosphere, but the effect of their

\* Page 258.

† Obs. Med. p. 31.



*aspects* was denied. But the opinion was not so speedily discredited among other classes of men, as with physicians. Some of the first characters in France were infatuated with their belief in pretended prophets. Wierus\* says they were remarkable in his time on this account. Sully declares that one of the considerations which kept him faithful to his master, in the most unpromising state of his affairs, was a prediction of La Brosse, that Henry would make his fortune†; Henry himself was very uneasy, before his assassination, on account of some prophecies‡. The astrologer Morin directed Cardinal Richlieu's motions in some of his journeys§.

In this country prophecies were always eagerly attended to: Commynes says, that in his time, an Englishman was never without a prophecy in his mouth. The statute of Queen Elizabeth against false prophecies, was occasioned by the disturbances they excited in the state; the Earl of Northampton, in his *Defensive*, asserts that they had produced many civil commotions, and this assertion is repeated by Sir Edward Coke. During the reign of James I. the fashionable opinions encouraged every species of delusion: Lilly was an useful tool to the Long Parliament, and if we may trust his own representation, con-

\* De Prestig. Demon.

† Memoir.

‡ Mem. de Sully.

§ Bayle Art. Morin.

sidered

sidered by them with respect; astrologers and prophets swarmed at that time, and the credit given to them will cease to surprize, when we recollect that the predictions of Rice Evans, who lived then, have found defenders in Warburton and Jortin\*. To these we may add the names of Cudworth and Morhoff; the former defended prophecies in general, the latter the quatrains of Nostradamus†. It was in 1707, when this nation was advancing rapidly in the career of science, as well as of arms, that the French prophets appeared among us. They spoke Latin and Greek without understanding either, as they pretended(ε). It must be confessed that these inspired passages are extremely barbarous, but they made noise enough to attract the notice of government, and the prophets finished their mission in Bridewell. A fact deserving more attention, is that at this time, when the extension of knowledge and reason is so proudly boasted, and in this island of philosophers, as some delight to term it, the possession of a prophetic faculty is believed in some of the northern parts of the kingdom; and *that* supported by evidence so strong, as nearly to convince one of the most acute philosophers of the age, in his visit to those regions. This species

\* See the Appendix to the first vol. of Jortin's Eccles. Hist.

† Polyhist. lib. I. cap. X. tom. I.

of divination, second sight, or *Taisb* as it is called by the natives, consists in a day-vision: as I know no better description of it than Thomson's, I shall borrow his words.

As when a shepherd of the Hebride isles,  
Plac'd far amid the melancholy main,  
(Whether it be lone fancy him beguiles,  
Or that ærial beings sometimes deign  
To stand embodied to our senses plain)  
Sees on the naked hill, or valley low,  
The whilst in ocean Phœbus dips his wain,  
A vast assembly moving to and fro;  
Then all at once in air dissolves the wond'rous show.

CAS. OF INDOLENCE, C. I.

A very distinct view of the Second Sight may be found in Martin's History of the Western Islands, with a large collection of narrations, furnished chiefly by the author's friends; several communicated by the *Seers* themselves. The visions are frightful, and uneasy to the Seer, who thinks himself unfortunate in possessing this faculty. His appearance to the spectators, during a vision, (for he alone perceives it) is, as described, something like that of a patient in catalepsy; he becomes immoveable, his eyes are fixed, and the eye-lids sometimes reverted. However if another Seer be present, the first can make him participate the vision, if he has presence of mind enough to touch him. They do not always understand the meaning of what

they see, and even when they form an absolute prediction, in consequence of former experience, they are treated with derision. *Horses* and *cows*, adds my author, possess the second sight. Whatever may be the case with these sagacious animals, it appears highly probable that the Seers are hypochondriacal persons. Their insular situation, their solitary employments, their oppressive poverty, added perhaps to the wild, uncultivated scenes of their country, are sufficient to produce a depraved state of body, and consequently of imagination, in those who are at all pre-disposed. A proof that the visions originate in the person's own fancy, is given, undesignedly, by Martin himself. He relates that a Seer informed him, he was entirely relieved from his visions by wearing a sprig of St. John's-Wort quilted in the cape of his coat. Whatever effects this plant (called *Fuga Dæmonum* from its supposed virtues) might have produced internally as a bitter, no medical qualities could be exerted by it in this case; and it is difficult to account for the contempt with which Martin confesses the predictions were at first treated, otherwise than by supposing that the greater number had proved fallacious.

Wierus supplies an ample list of the different species of divination. The *Chrystallomantia* is well known in this country, by the fame of Kelly and Dee. This consists in appearances of spirits,  
or

or natural objects,' desired to be seen, in a magical lens. Meric Casaubon published Dee's Conferences with Spirits, in a large folio, accompanied with a Preface. Some curious particulars respecting this man, of Evans, and Forman, who was employed in Somerset's affair, may be found in Lilly's Life; or in the Antiquarian Repertory, where they have been lately republished.

Martin relates that a species of divination had been practised in some of the western islands, within his memory, which does not appear to have prevailed in the rest of Europe; at least I find no notice of it among the demonologists. The persons desirous of an oracle went into a solitary place, carrying with them an ox, which they killed on the spot. A fire was then made, under a rock, or near a tree, the animal was flayed, and the boldest of the company was wrapped up in the hide, tied fast, and left alone during the whole night, to expect an answer to the demand made by his friends, from invisible beings whom he heard about him. Martin adds that he had this relation from a person who himself had passed a night in the hide, and who assured him that he heard such dreadful things during that night, that no temptations should ever induce him to expose himself again in the same situation (F). It is remarkable that this sort of oracle should be so little known

to demonologists, since we meet with nearly the same thing in the *Eneid*, when Latinus consults the oracle of Faunus :

----- huc dona facerdos  
 Cum tulit, et cæsarum ovium sub nocte silenti  
 Pellibus incubuit stratis, fomnosque petivit ;  
 Multa modis simulacra videt volitantia miris,  
 Et varias audit voces, fruiturque Deorum  
 Colloquio, atque imis Acheronta affatur Avernis.

Lib. VII. 86.

The inhabitants of the western isles used to divine, also, by roasting a cat.

The original opinion of *Magic* seems to have been formed merely from the superior knowledge or dexterity of individuals. The fullest proof of this may be found in Naudé's *Apology for great Men accused of Magic*; where he makes it apparent, that, at particular times, superior abilities always drew this imputation on their possessor. And all the writers on this subject allow, that natural magic, which is their first division, implies no more than an acquaintance with the least obvious facts of natural philosophy\*. Excellence in a particular profession sometimes constituted a magician; thus, in the last century, Dr. Bartolo was seized by the inquisition at Rome, on a charge of necromancy, because he unexpectedly cured a nobleman of the gout†. It is

\* See Agrippa, Cicogna, Morhoff, &c. &c.

† Eryth. Pinacoth. II. p. 75.

probable

probable, that for a long time, magicians were supposed to operate only by natural means, the powers of which could not be estimated in times of general ignorance. The repetition of verses, or the preparation of herbs, were the first magical acts: Cicero imputes the origin of the word *Saga* to the ideas I have been describing. *Sagire enim sentire acutè est; ex quo sage anus, quia multa scire volunt, & sagaces dicti canes\**. But by degrees, religious opinions were interwoven with magic, and at length Plato's hypothesis of aerial demons furnished a system from which magical arts were explained with sufficient plausibility. *Quanquam Platoni credam, says Apuleius, inter Deos & homines, natura et loco medias quasdam divorum potestates interfitas, easque divinationes cunctas & magorum miracula gubernare†*. After the establishment of christianity these operations were ascribed to diabolical influence, exerted by compact with the magician. The differences of this opinion will be explained presently.

Magic is usually divided into natural and divine, lawful †, and unlawful ‖. Necromancy consisted in employing members of dead bodies as charms or remedies: according to this definition, it was necromantic in all the colleges of Europe to insert the human skull as a remedy in their dispensaries. But a complete table of

\* De Divinat. lib. II,

† Or ceremonial.

† Apologia Prima.

‖ Or demoniacal.

its divisions, with the operations which they severally include, may be seen in Paracelsus's *Philosophia Sagax*, where its branches appear very numerous. Of all these, however, the division of witchcraft, including possessions, has excited most attention, and has indeed been most interesting, as a theological, legal and medical question. It is chiefly with respect to the last that I mean to consider it.

I shall not meddle with the controversy of Jannes and Jambres, the magicians of Pharaoh, nor inquire whether the witch of Endor had a closet\*, neither is it necessary to collect the classical authorities for witchcraft: all this has been fully done†, and every thing, credible and incredible, relating to the civil and religious history of the subject may be found in Wierus, Delrio, and in a very extraordinary book, entitled the *Imaginations of Mr. Ouffle*, which, with the most childish arrangement, and great poverty of invention, exhibits the completest collection of demonological facts to be found in any one work.

That in early states of society, diseases were supposed to be inflicted by supernatural powers, is an acknowledged fact, and follows naturally from the general principle, of men's anxiety to surmount their ignorance of the relations of cause

\* See Scott and Webster.

† Wier. de Lamiis.



and effect. The disposition, which, in one age, made Esculapius a god, in another, made Dr. Bartolo a necromancer; among the Egyptians the offices of priest and physician were originally joined; among the Jews, the priest cured the leprous; among the Greeks, spasmodic diseases, and particularly epilepsy, were imputed to the anger of the gods, and managed by diviners. The first part of Hippocrates's Treatise De Morbo Sacro is written against this superstition, and contains a curious account of the diagnosis formed by the medical diviners. *Siquidem namque (ægri) capram imitentur, & balatum edant, dextramque in partem convellantur, deorum matrem in causa esse asserunt. Si vero acutiorem & vehementiorem vocem edat æger, equo simile esse dicunt, & ad Neptunum causam referunt. Quod si stercoris aliquid emitat (quod nonnullis morbo pressis contingit) Hecates Enodiæ appellatio adhibetur. Sin autem tenuius & crebrius dejiciat, velut aves, Apollo Nomius. Si verò spumam ex Ore demittat, & pedibus calcitret, Mars auctor est.* He adds that besides the employment of ceremonies, they forbid their patients to wear a black vestment, because black denoted death, or to sleep on a goat-skin, or to place either hand, or foot, upon the other. According to these rules, says he, a Libyan would never be cured of this distemper, for in Libya goat-skins are universally worn and slept in.

Galen followed Hippocrates in ascribing all diseases to natural causes, and Avicenna Galen. An expression in Hippocrates's Prognostics, however, puzzled them a little, and was long urged by demonologists, who always think themselves at liberty to represent facts and opinions in the way most favourable to themselves. Thus Quinctius's collection of dreams, apparitions and prophecies retailed in Cicero's first book of Divination, is quoted largely by those writers, without any notice of the refutation produced in the second. Hippocrates has said that a physician ought to distinguish what is *divine* (*τι θειον*) in diseases. As this apparently contradicts the sentiments delivered in his *Treatise de Morbo Sacro*, Galen, in his Commentary on the passage, supposes that the phrase is a græcism, though it appears to have been generally understood in the literal sense; he explains it to signify, that a physician should study the nature of the atmosphere, from which so many diseases were supposed to proceed. Aretæus supplies an useful criticism on the word *θειον* as applied to epilepsy, which strengthens Galen's supposition. The disease is thus termed, according to him, on account of its severity, because *θειον* and *μεγας* were synonymous with the Greeks. Among the modern commentators on Hippocrates, Horstius has the ingenuity to reconcile his opinion, and that of Galen, with his own. He allows that

Hippocrates

Hippocrates must allude to the nature of the atmosphere, but thinks he refers to an occult quality produced by the immediate act of divine power, or, according to his own theory, by astral influence.

It would have been happy for Europe, if physicians, after the revival of letters, had followed the ~~wise~~ and temperate dictates of their great master, with as much care as they investigated his uncertain hypotheses. As medical men generally determined the nature of the diseases imputed to fascination, some spirited decisions on the side of common sense might have checked the sanguinary proceedings, which disgraced all the sixteenth, and great part of the seventeenth centuries. But a passion for mysticism, which in one shape or other haunts the infancy of literature, as well as of society, seized the faculty, and they dictated, at their ease, those wretched absurdities, by the authority of which hundreds of their fellow-creatures were subjected to imprisonment, tortures, and an agonizing death.

I cannot proceed without observing, that the history of this delusion is a perpetual reproach, to those who treat all innovations in speculative opinions with indignation: the first writers against the doctrine of witchcraft were stigmatized as *atheists*\*, yet they only endeavoured

\* By Dr. Henry More, Glanville, and Cudworth, in this country.

to prove the imbecility of the persons taxed with supernatural operations, and the infatuation or knavery of their accusers.

- - - αἱ εἰς δὲ πυραὶ — καίοντο θαυμασταί.

ΙΑΙΑΔ. Α.

For a considerable time after the *Inquisition* was erected, the trials of witches (as heretics,) were confined to that tribunal, but the goods of those who were condemned being confiscated to the holy office, its ministers were so active in discovering forcerers, that the different governments found it necessary to deprive them of the cognisance of this crime\*. On the continent, commissioners were then appointed for the discovery and conviction of witches, who, though less active than the inquisitors, were but too zealous in prosecuting their function. In 1494, Sprenger and Institor, two persons employed in this commission, published a collection of trials, most of which had come before themselves, under the title of *Malleus Maleficarum*; this served as a kind of institute for their successors. Soon afterwards, the appearance of Agrippa's Occult Philosophy strengthened the delusion, although that celebrated man did not credit the power of forcerers†. He believed indeed in magic, but it was on the principle generally allowed at that

\* Cardan.

† Naudé's Apolog. p. 193.

time,

time, that there was an exact conformity between the visible and invisible worlds, consequently a possibility of affecting what is unseen, by its sympathy with the natural subject, on which the magician operates (c). He also believed it possible to establish a commerce with angels. But the fourth book of the occult philosophy, which contains the forms for invoking demons, and descriptions of their different appearances, according to the method of invocation employed, is declared by Naudé and Wierus to be spurious, as well as the ridiculous treatise imputed to Trithemius. Upon the whole, Agrippa appears in the three first books, where he is most mystical, to confide in natural means, or angelic influence. His book, however, procured him the character of a forcerer, which was confirmed by his keeping a pug-dog with a collar, supposed to be an imp, and was put beyond all doubt by his exerting his influence to save a poor woman, accused of witchcraft, from the flames, at Cologne. Wierus, who had served Agrippa, gave rise to the first great controversy on this subject\*. His master had taught him humanity, and he endeavoured, but with too feeble a hand, to stop the bloody proceedings of the judges. Wierus appears to

\* Bodinus says that some persons, before Wierus, attempted to shew the innocence of witches.

have been a well-disposed, weak man, with extensive reading on his subject, but too narrow-minded to comprehend it thoroughly. He involved himself in unspeakable difficulties, by admitting the action of supernatural powers in certain diseases, and in possessions, while he denied that witches had any concurrence in them. These appearances, said he, are illusions of the devil, who persuades simple and melancholy persons that the mischief he himself performs, is done by them, and at their pleasure. He was weak enough, to attempt the explanation of every story alleged by his antagonists, without questioning the truth of the facts. What puzzled him most was the *dura materies*, that is, the crooked pins, old nails, black flannel, and other substances (or *varia materies*) vomited by the patients. There were three hypotheses for this phænomenon; 1. That the matter was only *apparently* discharged, by an illusion, for Grillandus, an eminent lawyer, observed that when the substances vomited were kept for some days, they began to liquify, and at length disappeared: 2. Or that the devil enlarged the pores of the body, so as to introduce the *dura materies*, and then shut them up again; this was the opinion of Paracelsus and others\*: 3. Or that the devil introduced these substances into the mouth, &c.

\* Wier. de Malef. Affect. p. 313.

at the very moment when the assistants perceived them. This last opinion was adopted by Wierus, and certainly was a nearer approach to truth than the others, as it has been found that securing a patient's hands has prevented him from vomiting the *dura materies*\*, of which his pockets were full. A single instance will shew, however, that Wierus was excessively embarrassed by this hypothesis†. A girl complained of sudden pain in her side, and asserted that she felt a knife sticking in it, which she had just borrowed from her sister; her relations laughed at this as an idle fancy, but on the bursting of an abscess which had formed on the seat of the pain, the point of a knife became visible, and the instrument was extracted by a surgeon from Wolfenbittel. Wierus, being a physician, knew very well that a knife six inches long could not be thrust into the cellular substance without any external appearance of wound or hæmorrhage; therefore he supposes the devil to have laid the knife upon the abscess, so as to discover the point, but to have concealed the handle by an illusion, *reliquam cultelli partem prestigiis velasse*. But as the knife was rusty, he believes the demon had kept it in some dunghill, and as its substance was corroded, he must have steeped it in an acid. This is a

\* Hutchinson's Ess. on Witchcraft.

† P. 307, &amp; seq.

sufficient

sufficient sample of the ingenuity of doctor Wierus(н). He was very anxious to prove that Agrippa's dog was not a demon, but a natural dog, called Monsieur\*: this strengthened the imputation cast on him by his adversaries, of forcery.

Bodinus, a French lawyer of eminence, who had assisted at several trials of witches, wrote against Wierus, in his *Demonomaniâ*. He urged the concurrent testimonies of sufficient witnesses, and the confessions of the witches themselves, to establish the existence of forcery. Wierus owned that the unhappy persons believed themselves to be guilty of the crimes alleged against them, but that they were deceived by the devil. But what do you make of the witches' meetings, cried Bodinus? The witches, replied his antagonist, are atrabilious. This explanation was so unsatisfactory that Wierus passed for a magician, whom the devil had furnished with specious arguments, to save others from punishment. Lerchemer, Godelmann, Ewichius, Ewaldus, and some others followed him, notwithstanding this stigma; but they were opposed by men of more acuteness and consistency than themselves; by Remigius, who had condemned several hundreds of forcerers to the flames, Delrio, whose book is a complete *Corpus Magiæ*, Cujas, Erastus,

\* De Magis Infamib. p. 111.



Scribonius, Camerarius\*, and a croud of others. Let us see what physicians thought of this controversy.

Paracelsus allowed that diseases may be produced by witchcraft, that is, by a demon, in compact with a human being†; but he thought the devil had more to do with the art of medicine itself, than with its objects. He imagined that this cunning adversary endeavoured to ruin medical practice, by raising up quacks, publishing erroneous books, and setting up ignorant apothecaries, that he might discredit the faculty, and bring patients to place their confidence in his own tools. *Medicinam enim intaminatam diabolus non finit, sed suscitatur pseudomedicos, profert erroneos libros, imperitos Pharmacopæos, &c. hoc fine, ut naturalibus mediis sua laus derogetur‡.*

Van Helmont also believed that the devil produced diseases, but that he operated on the magnetic spirit, which shall be considered elsewhere. He thought witches employed natural means; *sagæ operantur virtute naturali*||.

Paracelsus was loudly blamed for permitting magical remedies to be used, where the disease was imagined to be demoniacal. He was called a forcerer. So difficult was it for a writer at that

\* Delrio. and Burton's Anat. of Melanch.

† De Sagis.

‡ Ver, Influent, Rer.

|| Ort. Medicin. 479.

time to escape this imputation, that Bodinus himself was accused of sorcery by De Thou.

Sennertus, the first eclectic philosopher and physician of Germany, wrote an express treatise *De Fascinatione*. He believed that witches injure in three different ways; *per visum, vocem et contactum*: That the plague was often occasioned by the composition of certain powders and ointments, of diabolical prescription: That the operations of witchcraft are proved by the authority of judicial acts, and by the agreement of witnesses examined at different times, and in different places, but that the action is always demoniacal, though performed with the witch's consent. It is true, says he, I have cured patients of simple inflammatory complaints, which persons accused of sorcery acknowledged themselves to have produced; but as there was nothing preternatural in those diseases, I conclude that the devil, foreseeing the complaints, deluded the witch, by persuading her to put him on distressing the patient. He holds that the devil sometimes occasions diseases by the medium of natural causes, for example, epilepsy, palsy and melancholy; that he sometimes produces complaints altogether preternatural; and sometimes only attacks the fancy, occasioning imaginary diseases; that the nature of the materies dura is uncertain; but that witches are punishable for their *compact* and their consent to injure different persons.

persons. He quotes a case of witchcraft from Zacutus, a Portuguese physician, author of the famous *Definitio* of a Spoon\*; a young lady was cured of convulsions, in presence of Zacutus, by putting a paper cap, filled with magical characters, on her head. Dr. Balthasar Han communicates to Sennertus the case of a Lady, who was subject to sudden eruptions of *crosses* and *astrological characters*, on different parts of her skin: it is remarkable that Dr. Warburton quotes a similar story from Isaac Casaubon, to support the miracles attending Julian's effort to rebuild the temple of Jerusalem†. Mercatus, physician to Philip II. of Spain, a writer of uncommon accuracy and information, appears strongly inclined to deny the existence of fasciatory diseases; but he is constrained to acknowledge them for two reasons; first, because the inquisition had decided in favour of their reality; secondly, because he had seen a very beautiful woman break a steel mirror to pieces, by a single glance of her eyes, and blast some trees by merely looking on them; *solo aspectu*.

Heurnius did not admit morbid fascination, but he came round very ingeniously to the common superstition. He finds it recommended to

\* See Echard's Dialogue, (against Hobbes) and King's Useful Transactions.

† See his Julian.

drink human blood, and to eat a human liver, for the cure of epilepsy; these remedies he supposes to have been recommended by witches, who are imagined to be fond of human blood. To prove this, he quotes Apuleius and Philostratus. It is truly ridiculous to find demonologists quoting the romance of Apuleius, (which is a palpable satire on magical stories,) as true history (1).

Mylius, Mynsicht and Hofer (forgotten names) all believed the influence of witchcraft in diseases. I shall have occasion to speak of the two last, in treating of the remedies for preternatural complaints.

Baptista Porta was not only a demonologist, but a signaturist, that is, a believer in the conformity of the virtues of plants to certain external appearances, supposed to be impressed by guardian angels. The convallaria, or Solomon's seal, and some of the ferns, were celebrated remedies of this kind. A *Dissertation de Simplicium Signaturis* was published at Rome, by Sinibaldo, in 1690.

Severinus and Hartmann were followers of Paracelsus.

Fernel saw a demoniac, who spoke Greek, without understanding it.

Merindol, who flourished at Aix in Provence, about the beginning of the last century, had considerable practice in fascinator diseases; he had  
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the capuchins, the nuns of St. Clare, and the Ursulines, under his care, all bewitched(κ). In a dissertation annexed to his works,\* he treats very fully of Amulets, which he divides into four kinds, divine, diabolical, vain, and natural. He permits the use of the first and the last.

Dr. Thoner of Ulm relates a case of witchcraft, in his consultations, which will be mentioned more particularly hereafter. Carrichter is a medical demonologist, constantly quoted, whose works have never come in my way.

Schenkius, in his *Section de Demoniacis*, affords nothing remarkable, excepting his advice to try exorcism first, and natural remedies afterwards.

Fludd believed diseases to be inflicted by the ministry of angels. He published a *Treatise de Mystica Morborum-Causa*.

Dr. Willis, whose labours contributed so much towards forming the nervous pathology, supposed convulsive disorders to originate, in some cases, from witchcraft†. He assigns the common rules for discovering such appearances, which shall be noticed afterwards.

Even the author of *Religio Medici*, if Dr. Hutchinson may be credited‡, inclined so strongly to this persuasion; that being interro-

\* Num liceat Periaptis ad morborum curationem uti.

† De Morb. Convulsiv. p. 43.

‡ Essay on Witchcraft, p. 151.

gated by Lord Chief Justice Hale, concerning a convulsive disease, attributed to two poor women who were tried before him, "he declared, that he was clearly of opinion, that the fits were natural, but heightened by the devil, co-operating with the malice of the witches, at whose instance he did the villanies."

In consequence of this opinion, the criminals were condemned.

Towards the close of the last century, Dr. Boulton, an English physician, published his *Medicina Magica*, which I have never seen. Mean time, the belief in sorcery was so prevalent with the faculty, that a periodical work published in Germany, to which the first physicians of the time contributed, was filled with histories of demoniacs, and diabolical illusions of all sorts; I mean, the *Miscellanea Curiosa*.

One or two cogent examples are there recorded of demoniacal copulation, a subject on which saints, and fathers of the church, as well as lawyers and physicians, have exerted themselves to accumulate the most disgusting impurities.

Another periodical collection, of considerable note, the *Acta Hafniensia*, published by the Bartholines, contains a good deal of demonology. One of the correspondents relates that a country fellow becoming *possessed*, recited a page of the *Timæus*, to every one's astonishment\*. Chris-

topher Bartholine heard the following story from the mouth of the sufferer (a miner.) Going to his work one morning, the devil met him, in form of a little man, and offered him a pinch of snuff. This, the workman thought proper to decline; the devil, enraged to find his courtesy despised, flew upon him, and beat him severely\*.

In the same work, is a consultation of Dr. Hannerman on a case of impotence; the doctor's first inquiry is, *an naturale, an magicum vitium sit* †?

In this country, while the belief in witchcraft was supported by royal authority (for James I. is universally known to have written on demonology) countenanced by Bacon‡, and generally adopted among the people, only one writer was hardy enough to oppose it. This was Reginald Scott, who published a collection of impostures detected, under the title of Discoveries of Witchcraft. James ordered the book to be burnt by the common executioner, and the judges continued to burn witches as usual. During the civil wars, upwards of eighty were hanged in Suffolk, on the accusations of Hopkins, the witch finder§. Webster was the next writer against witchcraft, but he had a different fate from that of Scott, for most of his arguments were refuted by

\* Ib. p. 12.

† Ast. Hafn. T. III.

‡ Nat. Hist. Cent. X.

§ Baxter, Hutchinson, and Hudibras, C. III.

Glanville. This very acute writer was induced to publish his *Philosophical Considerations about Witchcraft*, by the apprehension, that the increasing disbelief of witches and apparitions tended to affect the evidences of religion, and even of a Deity. In respect of argument, he was certainly superior to his adversaries; his reasoning is perspicuous, though sometimes subtle, rested on the most specious foundations of evidence, and arranged with great skill. In the first edition, he contented himself with relating the celebrated story of Mompesson, as an example of the reality of demoniacal illusions, but afterwards he collected a considerable number of histories\*, which were published after his death by his friend Dr. Henry More, who took an active part in the controversy, and subjoined to the *Saducismus Triumphatus*, as Glanville's book was now entitled, a dissertation of his own, on the True Notion of a Spirit. Dr. More had previously related various absurd stories in his *Antidotus Adversus Atheismum*, for, in the abundance of his zeal, he also considered the denial of the power of witches as atheistical. The celebrated Baxter added his name to the defenders of witchcraft; he made great use of the German demonologists, and of the unhappy affair in New England. He thought the devil so

\* In this collection, by Dr. More's confession, there are considerable mistakes both of persons and places.



active against well-disposed persons, as frequently to raise whirlwinds, in order to carry away their linen, when hung out to dry: truly, says he, I have often wondered to see my own small linen caught up in an eddy, and carried out of sight, over the church-steeple\*! (L) Several others engaged in the controversy, a list of whose works may be found in the dedication to Dr. Hutchinson's historical essay concerning witchcraft, published about seventy years ago; a book which comprehends the most satisfactory proofs subversive of this opinion. Dr. Hutchinson also supplies a very good chronological view of the delusion.

On the continent, this controversy seemed almost forgotten, till Bekker published his *Monde Enchantée*, in which he denied the existence of witches on the Cartesian principle, that the Deity is the source of all action, consequently actions so opposite to his nature and attributes cannot be supposed to exist. He was answered by *Frederick Hoffman*, the father of the modern theory and practice of medicine, in his *Dissertation De Diaboli Potentia in Corpora* †. Dr. Hoffman sets out with the usual assertion of demonologists, that the facts establishing the doctrine are as certain as any in history; that the devil can alter the state of the atmosphere at pleasure, so as to raise storms; that he can

\* Certainty of the World of Spirits.

† Printed in the fifth volume of his Works, p. 98.

produce insects by his own power; that, with respect to the human subject, he can act upon the animal spirits, or even on the imagination, though he cannot divine our thoughts; and here the good doctor takes occasion to praise the devil's learning; "he is an excellent optician and natural philosopher," says he, "on account of his long experience;" *summus opticus et physicus, propter diuturnam experientiam*. This great man, who has so finely illustrated the theory of spasmodic diseases, thinks they are sometimes produced by witchcraft, although he considers the witches merely as passive instruments of the demoniacal action: he relates the case of a woman who was afflicted with a severe head-ach, from the time of her refusing to sell a calf's head to a supposed witch, and does not scruple to consider the disease as an effect of the witch's resentment. This dissertation was published in the large edition of his works, by the doctor himself, in 1747. From the time of Hoffman, I am not acquainted with any respectable writer in favour of witchcraft (excepting that Brucker mentions incidentally, in his excellent *Historia Critica Philosophiæ*, in 1766, that he thinks the question still undecided\*) till the year 1770, when Dr. de Haen of Vienna published a defence of magic, chiefly on the authority of Philo-

\* Tom. V. p. 711.

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The number of those who have been sacrificed to this delusion cannot perhaps be ascertained; by Dr. Hutchinson's collection of facts it appears, that, at certain times, many victims have fallen together, and it is a remark not peculiar to him, that the condemnation of one witch has always led to the discovery of others. The latest phrenzy of this kind, was that in New England, about 1692, when, says Hutchinson, *the imprisonment and execution of witches made as great a calamity there as a plague or a war*. The accusers became so daring, that neither civil nor religious authority would have proved a security against their attacks, if all the prosecutions had not been suddenly dropped, and the prisoners set at liberty. So far did those wretches proceed in absurdity, that a dog was accused of throwing persons into fits, by looking at them\*.

One Parris, a minister at Salem, was at the bottom of this horrible business, but it is worth while to observe, as a key to the dispositions of the people, who submitted to so gross and fatal an imposition, that they believed the Indians to be magicians; and Mr. Cotton Mather imputed

\* Hutchinson, p. 107.

the frequency of witchcraft, during the general delusion, to spirits sent among them by the Indian conjurers, or *Paw-waws*, as the colonists term them\*. Another instructive circumstance is, that as soon as the prosecutions were stopped, all reports of witchcraft ceased:

In this country, the discouragement long given to all suspicions of witchcraft, and the repeal of the statutes against that crime, though they have much weakened, have not eradicated the persuasion; some periodical publications, conducted by men of letters, afford proof of this, and the Bristol story, though unpublished, is a recent and striking confirmation.

In 1786 however, the Count de Cagliostro was accused of forcery by Madame de la Motte†, at Paris.

It will be easier to discover the sources of deception in those cases, if we consider the signs of fascination in the patient, established by demonologists; the indications by which the forcerer was traced; and the nature of the remedies which have proved successful in demoniacal cases.

I. 1. A sudden attack of any disease, in a person previously in good health, was held a reason for

\* Id. p. 101. Massinger has made use of this opinion, in his *City Madam*.

† *Memoire pour le C. de Cagliostro.*

suspecting

preternatural influence\*. It is evident that this test was admitted entirely from conjecture and presumption, because several persons certainly accede without much previous disposition.

When the cause of a disease did not readily manifest itself, it was generally attributed to witchcraft†. Thus, the atrophy of infants was commonly imputed to the power of *evil eyes*, and Bonnetus has treated largely of this sort of fascination.

3. Convulsive diseases were supposed to be preternatural, when such muscles were affected, as produced unusual contortions, of a terrifying appearance. The case of the Norfolk boy, in the late Dr. Wall's Medical Essays, has all those symptoms which a demonologist would require, to establish it as an instance of fascination; and we learn that his parents suspected such an influence. The only thing deficient in this story, for the purpose of demonology, is that the boy did not speak Greek or Latin; that is, he wanted just so much of being an impostor. In the ninth volume of the Medical Commentaries, published in 1786, are three cases of convulsions, in which the appearances were so extraordinary that the country people supposed the patients were bewitched.

\* Dalton's Country Justice.

† Joubert.

4. Demonologists build much on the *spectral sight*, that is, on the apparition of the witch to a patient, during the fit: this circumstance procured the condemnation of most of the persons accused in New England. It is well known, that several disorders are attended with very terrible spectral appearances; particularly the *ephaltes*, or night-mare, the delirium of fevers, and some varieties of melancholy and madness. It is equally certain, from the trials which have been published of those unhappy sufferers in America, that several of those who thought themselves bewitched, had no other complaint than the night-mare, during the accession of which, the image of some unfortunate neighbour was presented to them, who paid for the fumes of another's indigestion, with life.

Demonologists have been much puzzled to account for the spectral sight, for it was long a question among them, whether the devil could transport the witch, *bodily*, into a house when the doors were shut. Dr. More believed that the *astral spirit* only was carried about; the American demonologists supposed that the devil produced this appearance himself, by operating on the patient's imagination: even Dr. Hutchinson was inclined to Wierus's opinion respecting demoniacal interference\*. This concession, which the  
writers

\* It was a question seriously agitated, among demonological writers, whether the devil can appear in the shape of  
a good

writers in favour of diabolical illusions find themselves obliged to make, comes near what I believe to be true; that the illusion subsists in the patient's imagination: there needs no devil to produce it there.

5. When any natural action was suddenly impeded, the patient was sufficiently apt to suppose himself bewitched, especially if his incapacity was of a disgraceful nature. This power, imputed to forcerers, was termed the *ligature*, and, according to Wierus and Delrio, who treat of it fully, was not confined to the human body, but extended to inanimate objects; thus, according to Wierus\*, a fleet might be bound fast in port, notwithstanding favourable winds, and all the efforts of the mariners; he adds that an army may be rendered inactive and useless, by the *ligature*; events equally surprizing have happened in our times, without provoking any suspicion of witchcraft.

6. The appearance of the *dura and varia materies*, already spoken of †, was always reckoned decisive, where other appearances had given suspicion of a preternatural disease. When we read of rats, black, scaly frogs‡, black flau-

a good man, and especially of a good catholic? (See Lavater de Spectris.) This was generally decided in the affirmative.

\* P. 329.      † In p. 14.

‡ Thoner. Observ. p. 224.

nel, &c. vomited by patients, it is impossible to avoid recollecting Dr. Smollett's story of the *three black crows*, yet Wierus asserts that he has taken pieces of flannel out of a patient's mouth, immediately after inspecting it diligently, to satisfy himself that nothing was concealed there\*. He is obliged to confess that the substance extracted had never been in the stomach, because it was *scarcely wet*, and if we say, in pursuing his theory, that a *confederate* and not a *demon* introduced the *materies* into the mouth, all the obscurity of the question vanishes.

II. 1. In tracing suspicions of magic, it cannot be too often repeated that knowledge and address exceeding the common standard were frequently their sole foundation. Most of the popes were reckoned magicians, according to Wierus†, who adds a particular relating to Gregory VII. which deserves some attention : that Pontiff was held in great veneration, because when he pulled off his gloves, fiery sparks issued from them ; *quando volebat*, (Wierus quotes from Benno,) *manicas discutiebat suas, unde ignis in scintillarum modum diffiliit*. This is a curious anticipation of Canton's discovery.

2. The signs pointed out by demonologists are futile and inconclusive(m). One of them is drawn from the suspected witch inquiring anxiously about the health of the patient. Ridi-

\* P. 286.

† P. 358.



culous as this may appear, it is to be found among the directions for examining witches, in Dalton's Country Justice. The mark, supposed to be set by the devil on these unhappy creatures, was one of the most certain signs, and industriously sought for; but Dalton acknowledges that this mark may strongly resemble a flea-bite. Another sign confided in by the same writer, is the appearance of the witch's familiar, that is, the imp devoted to her, in consequence of the demoniacal compact. Now Glanville, in his collections, affords several examples of the familiar appearing in shape of a *fly*, and Hutchinson asserts, that the witch finders concluded either a spider, beetle, or fly, to be the familiar, if the animal was found in the same room with the witch, and could not be killed by the assistants.

3. Bodinus acknowledges, that direct proof is not always to be expected, in cases of witchcraft; in which he is followed by Dalton. So zealous was the former, that he thought it justifiable to prosecute witches on the slightest suspicions, or common report; he owned that where nothing could be proved, their lives must not be touched, but punishment to a certain degree he thought necessary. The gentle inflictions of this pious judge, who comprehends fifteen several crimes under magic, were public whipping, and condemnation to the gallies. Thus, it is evident,  
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the criminal had little to hope, even from the deficiency of proof, and the boasted authority of those public trials vanishes on a close examination. But demonologists think the facts completely established by the concurrent testimony of witnesses, and by the confessions of witches, obtained without the application of torture. The witnesses must be divided into two classes, those who were themselves deceived, and those who deceived others. Of the first, I have pointed out examples in the New England affair, and some curious instances may be found in the story of the Nottingham boy\*; thus, one of the witnesses deposed "that he had seen the boy "turn his face directly backward, not moving "his body; and that his eyes were as large as "beast's eyes; and that his tongue would be "thrust out of his mouth to the bigness of a "calf's tongue." Mark now, how all these wonderful circumstances disappear, on his cross-examination: "my meaning was," says he, "that he turned his face a good way toward "his shoulder, and that his eyes were somewhat "goggling; and by reason that it was candle-light when I saw his tongue thrust out, "and by reason of my conceit of the strangeness of "Somers's troubles, it seemed somewhat bigger "than, if he had been well, I should have

\* Hutchinson, p. 242.

"thought

“thought it to have been\*. At the same time, the commissioners, who examined the nature of the boy’s fits, were all terrified by seeing a black dog in the room, belonging to a Spurrier, which they took for the devil†. In 1633, seventeen persons were condemned at Lancaster assizes, on the evidence of a boy, who afterwards confessed himself to be an impostor; Webster says he heard this confession from the boy’s own mouth.

This second class of witnesses got money from the well-disposed‡, and therefore are of no credit.

Demonologists, indeed, profess themselves willing to give up all instances where any deception can be pointed out, and confine themselves to those which are not circumstantially disproved; they exult particularly in the story of Mompeçon, which is published at great length, in the *Saducismus Triumphatus*. It is true that no imposition was ever discovered in that affair, but it is a strong presumption against the demoniacal nature of the disturbances, that when the King sent some Gentlemen to inquire into them, every thing was quiet during their residence in the house. Glanville excuses this, by saying that

\* Id. p. 260.

† Id. Ib.

‡ The Robinsons, who accused seventeen at Lancaster, went from parish to parish, and received contributions—Hutchinson.

produce insects by his own power; that, with respect to the human subject, he can act upon the animal spirits, or even on the imagination, though he cannot divine our thoughts; and here the good doctor takes occasion to praise the devil's learning; "he is an excellent optician and natural philosopher," says he, "on account of his long experience;" *summus opticus et physicus, propter diuturnam experientiam*. This great man, who has so finely illustrated the theory of spasmodic diseases, thinks they are sometimes produced by witchcraft, although he considers the witches merely as passive instruments of the demoniacal action: he relates the case of a woman who was afflicted with a severe head-ach, from the time of her refusing to sell a calf's head to a supposed witch, and does not scruple to consider the disease as an effect of the witch's resentment. This dissertation was published in the large edition of his works, by the doctor himself, in 1747. From the time of Hoffman, I am not acquainted with any respectable writer in favour of witchcraft (excepting that Brucker mentions incidentally, in his excellent *Historia Critica Philosophiæ*, in 1766, that he thinks the question still undecided\*) till the year 1770, when Dr. de Haen of Vienna published a defence of magic, chiefly on the authority of Philo-

\* Tom. V. p. 711.

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One Parris, a minister at Salem, was at the bottom of this horrible business, but it is worth while to observe, as a key to the dispositions of the people, who submitted to so gross and fatal an imposition, that they believed the Indians to be magicians; and Mr. Cotton Mather imputed

\* Hutchinson, p. 107.

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all magical operations was ascribed to the innate confidence of the magician\*. It was a common question among philosophers, in the last century, whether the imagination could move external objects, generally decided in the affirmative; the reality of demoniacal action, (the result of simple intelligence) was one of the strongest reasons for this determination. The wits might be expected to divert themselves with this enthusiastic philosophy: accordingly Ariosto reckons magical pursuits among those which prove destructive to reason;

Altri in amor lo perde, altri in Onori;  
 Altri in cercar, scorrendo il mar, ricchezze;  
 Altri ne le Speranze di Signori;  
 Altri dietro a le magiche sciocchezze.

Cant. XXXIV. S. 85.

Rabelais makes very free with Agrippa's philosophical character, under the ludicrous name of Her Trippa; and in the *Epistolæ Obscurorum Virorum*, Ortuinus is made to retail some of the most ridiculous conceits that have found their way into magical books. But the most formidable enemy to those doctrines was our own Butler, who bent such a force of ridicule against them, as expelled them entirely from the higher

\* By Paracelsus, (after Pomponatius and the Arabian physicians) Lord Verulam, *Sylv. Sylvar.* p. 206, and Fien. de Virib. Imaginat. p. 59.



ranks of men, among whom they were admitted before.

III. The remedies employed in diseases supposed to be preternatural, may be divided into magical and natural. Of the first, the cure by pronouncing certain words, or verses, is the most ancient; for the method by emblem, of which the brazen serpent, erected by Moses, was the first example, was not magical, but miraculous. The former is generally termed the Homeric cure, because the oldest instance of it is found in the *Odyssey*: A dissertation on this subject is ascribed to Galen. Serenus thought it efficacious(o), as did Ætius, Pliny, Alexander Trallianus, Marcellus, Gordonius and Ferrerius. Antonius Benivenius relates that an arrow was drawn from a soldier's body, by a song. Celius Aurelianus had told that the Emperor Adrian cured a person of a dropsy, by reciting certain words\*. Who can wonder, after these examples, at the conduct of Buchanan's Franciscans?

Conceptis verbis de somno surgere, mensam  
Ponere, adire, referre, jubere, orare, salutem  
Dicere, conceptis urinam reddere verbis.

A collection of some very ridiculous forms, for the cure of different diseases, is furnished by Wierus†. Bodinus thought it very impious,

\* Delrio *Disq. Magic.* p. 48. Fien. de Virib. Imaginat.  
p. 92.

† P. 376 de Curat. lxx. Malef.

and even blasphemous, to print them. Certain plants, as I mentioned above, were supposed to exert remarkable properties, in consequence of their signatures: Josephus relates that he saw a certain Jew, named Eleazer, draw the devil out of an old woman's nostrils, by the application of *Solomon's seal* to her nose\*, in presence of the emperor Vespasian. The same author relates wonders of the herb Baaras, as Ælian does of the *Cynospastus*†, and different authors of the *Mandragora*.

Amulets form the principal part of magical remedies, but many amulets were not properly magical; those composed of relicks, or of medicinal substances, must be exempted from this appellation. But, though they were remedies of the imagination only, it was generally believed that those composed of characters were the produce of demoniacal compact, and therefore unlawful. During the greatest part of the last century, it was very generally believed that a man might be rendered invulnerable by means of an amulet, and in the thirty years war, most of the officers wore one on duty‡. Some dissertations on this subject may be found in the *Miscellanea Curiosa*§, the *Acta Hafnienſia*§, and something in

\* Wier. p. 415.

† Id. p. 416.

‡ Harte's Prel. Disc. to Guſt. Adolph.

§ Tom. XII.

§ Tom. III.

Sennertus. In the account of Gowrie's Conspiracy, published by authority, one of the witnesses solemnly deposes, that after the Earl had received his mortal wound, he did not lose a drop of blood, till an amulet was taken out of his pocket. In Germany, it was believed that muskets might be charmed from firing: Dr. Clauderus, author of several essays in the *Miscellanea Curiosa*, published on this useful art, under this title, *De Impedienda Tormentorum Explosione*\*. Naudé refuted this opinion in his book *De Studio Militari*. Most of the demonologists, however, follow St. Thomas in believing that those characters, or particular substances, had no efficacy in themselves, but were enjoined by the devil to the over-curious, as signs of convention, or tokens of submission†, of which last, he adds, the devils are very fond.

The origin of amulets was very remote; the Trojan Palladium is said to have been composed of the bones of Abaris the Scythian, (the first aerial adventurer recorded in history) and thus was properly an amulet, in structure as well as design.

Pomponatus ventured to assert, that all remedies of this sort act on the imagination alone, and that a dog's bones would produce all the effects of the most venerated relics, if they were worship-

\* Tom. XIV.

† Delrio, Wierus, &c. &c.

ped with an equal degree of confidence\*. In this scepticism, however, he was countenanced only by the outrageous partisans of the imagination, such as Dr. Fienus of Antwerp.

The natural remedies, as might be expected, were those adapted to hypochondriacal or hysterical disorders, as one or other of these was mistaken for a possession; when there was reason to suspect imposture in the fits, flagellation succeeded admirably. But many grave physicians employed even antispasmodic and cathartic medicines, on the supposition of their exerting specific powers, and almost every man had his favourite demonagogue. The herbalists always notice some plants for this purpose. Dr. Thoner extols *mercurius vite*, as remarkably useful in expelling preternatural substances from the body; but holding some other application necessary to extract the substance in which the *seminale principium* of the fascination lodged (that is, the bewitched bread or apple offered the patient by the sorcerers) he applied, in the case treated by him, a cataplasm *ex stercore maleficiati*†. Dr. Mynsicht cured several persons bewitched, with *asafoetida* applied in form of a plaster, though Hofer, in his *Hercules Medicus*, doubts whether such persons can be cured by natural means‡. Two theories

\* Fien. de Virib. Imaginat. p. 87, 192.

† Observ. p. 224.

‡ P. 452.

were advanced, to account for the action of *asafoetida* in expelling demons; either that the devil thought himself insulted by so vile an application, and quitted the patient with disdain of his ill manners\*, or that, as devils may be said to have eyes and ears, it is very likely that they may have noses also†. The thing was never fairly decided.

Such have been the perplexities of demonologists; perplexities which the finest talents were employed to clear up, without effect. As learning was freed from these clouds, they subsided among the vulgar, only to make way for succeeding illusions, less fatal indeed, but not less ridiculous.

Both the theory and evidence of apparitions rest on the same foundations with those of witchcraft, for it is not supposed, by most of the philosophical writers on this subject, that the souls of departed men ever revisit this planet: they attribute all spectral phenomena either to angelic or diabolical operation. A full discussion of this, and all other questions relating to apparitions, may be found in a very common book, *De Spectris*, written in 1570, by Lavater, a theologist of Zurich‡.

The universal prevalence of this illusion might be naturally expected, because solitude and silence

\* Thoner, p. 225.

† Id. Ib.

‡ See particularly from p. 120 to 154, Leyden edition. Le Loyer, *De L'Anchre*, and many others have also written on apparitions.

will always produce apparitions. Vives wrote that spectres were daily beheld in America, on its first discovery, and Olaus Magnus describes certain islands in the Norwegian seas, inhabited by spectres only, which often deceived the unwary sailor. Every inanimate object which could inspire dread by its properties, or awe by its appearance, had its spirit (after the establishment of Christianity) which was believed to be uncommonly active during particular seasons, when the observation of traditional superstitions disposed the mind to receive an impression of such power more readily;

When goblins haunt, from fire or fen,  
Or mine, or flood, the walks of men.

COLLINS.

at other times, imbecility found rest in the crowded devotions, and imagined holiness of a festival:

Some say that ever 'gainst that season comes,  
Wherein our Saviour's birth is celebrated,  
The bird of dawning singeth all night long:  
And then, they say, no spirit can walk abroad,  
The nights are wholesome, then no planets strike,  
No fairy talks, nor witch hath power to charm,  
So hallowed and so gracious is the time\*.

Those effects which we now ascribe to the presence of noxious airs in mines, were imputed

\* Mr. Locke has asserted, that there is no more connection between darkness and an apparition, than between light and an apparition; without considering the defenceless state, in which a person finds himself, in the dark.

with

with great confidence to the homines metallici, or demons of the mine; which is a good illustration of our principle(p). Whether the diminutive size of the fairies was inferred from the minute scale of the operations attributed to them, or was derived from the Platonic philosophy, (for opinions, as they become obsolete with the learned, frequently descend to the crowd) their existence was plainly assumed as an hypothesis, to account for some appearances, the natural causes of which were unknown. Our poet is good authority here;

Ye elves of hills, brooks, standing lakes and groves,  
And ye, that on the sands with printless foot,  
Do chase the ebbing Neptune, and do fly him  
When he comes back: you demy-puppets, that  
By moon-shine do the green-sower ringlets make,  
Whereof the ewe not bites: and you whose pastime  
Is to make midnight mushrooms——

Philosophy has not yet explained the production of the green-sower ringlets in a satisfactory manner.

The proof of spectral phænomena is rested by all their defenders on *evidence*, and according to them, it is impossible to deny those phænomena without destroying the foundation of all history. The apparition of Ficinus to Michael Mercato is a famous story, and of great credit among spectral philosophers; unluckily it came only

only from Mercato's grandson. Bayle observes\*, it was very unfortunate that Mercato did not make affidavit of the apparition, before a proper magistrate. Lord Clarendon's story is quite destitute of support, being a compound of hearsay and conjecture. The curious affair of the disturbances in Cock-lane, never thoroughly believed, and never clearly detected, added no strength to the doctrine of apparitions, but furnished another proof, that neither the force of natural talents, nor the helps of acquired knowledge, can eradicate the general disposition to the engaging horrors of supernatural agency. Ventriloquism was talked of in this instance, but can only be regarded as a still greater absurdity (Q).

Some of the best authenticated histories of apparitions, however, carry their own detection with them, in the absurdities established by their evidence. In Baxter's *World of Spirits*, for example, there is a copious narrative of the disturbances at Llanellin, in Glamorganshire, confirmed by concurrent testimonies of sufficient witnesses, with this circumstance among the rest; that oft-times the *shadow* of a person walking would be visible on the wall, while no substance capable of intercepting the sun's rays was sensibly present in that place. This is a physical absurdity, and cannot be true. But what shall

\* Dict. Art. Bonet.



we make of the evidence? cry the spectral philosophers. I would reply, that when men are once persuaded that such appearances *may* exist, they are very ready to impose on themselves the belief that they *do* exist. This may be supported by a fact from the Duke of Berwick's Memoirs, of no remote date, but which could not be received on less authority than that of a great and good man. A French army encamped before Saragossa, in 1707, under the command of the Duke of Orleans; let us see what followed, in the words of our author, who was present. "The  
" Count de la Puebla, to retain the people of  
" Arragon in subjection as long as possible, and  
" by that means to retard the progress of the  
" Duke of Orleans, persuaded the inhabitants  
" of Saragossa, that the reports of the march of  
" a fresh army, from Navarre, were false; and  
" *even that the camp which they saw was nothing real,*  
" *but only a phantom produced by magic;* in consequence of which, the clergy made a procession  
" on the ramparts, *and from thence exorcised the*  
" *pretended apparitions.* It is astonishing that the  
" people were so credulous as to entertain this  
" fancy, from which they were not undeceived  
" till the next day, when the Duke of Orleans's  
" light horse having pushed a guard of horse,  
" of Puebla's, briskly, to the very gates of the  
" city, cut off several of their heads there. Then  
" indeed the citizens were alarmed, and the  
" magistrates

“magistrates appeared, to make their submission  
 “to his Royal Highness. I could not have  
 “believed what I have related, if I had not  
 “been assured of its truth at Saragossa, by the  
 “principal people of the city\*.” It seems the  
*ligature* of armies could no longer be performed,  
 when this remarkable exorcism took place.

The principal writers on spirits, of this country, are Aubrey, More, Glanville, Baxter, Beaumont, and professor Sinclair, of Glasgow, to whom we must add Mr. Cumberland† a well-known living author, as the latest supporter of the doctrine among us, though he has produced only one history, and that of an old date(κ).

It was mentioned before, that some spectral philosophers accounted for the phænomena of apparitions from demoniacal action, but it must be observed, that some believed those demons to be material; this was the opinion of Psellus‡; Paracelsus supposed the elements to be inhabited by four species of demons; spirits, nymphs, pygmies (our fairies) and salamanders; these he reckoned material, but of a different substance from man, that is, of the *Caro non-adamica*; Cudworth was inclined to think that angels were material; and Dr. Henry More was so much pressed with the difficulties which he found in reconciling the

\* *Memoires de Berwick*, p. 398.

† *Observer*, No. 71.

‡ Cudworth's *Int. Syst.*

proposed

phænomena of spectres (in which he was a firm believer) with the immaterial system, that he proposed the hypothesis of an immaterial extensum\*, a supposition which later metaphysicians have found it convenient to adopt (†).

The present advanced period of the eighteenth century has produced a learned, an elegant, and what is still more, a fashionable theorist, in support of the doctrine of apparitions; and this subject is perhaps to owe more to the *present* than to the *former* Lavater of Zurich. This writer, generally interesting and instructive, often enthusiastic, but always amiable, may possibly give a turn to the fortune of an opinion, which most persons are rather anxious to destroy, than able to confute. Mr. Lavater applies, in some measure, the doctrine of the *transmission of spirits* to the theory of spectral phænomena. *L'Imagination*, says he, *excitée par les desirs de l'amour, ou ecchauffée par telle autre passion bien vive, opere dans des lieux et des temps éloignés*†. This is exactly the doctrine of Fienus, Lord Verulam, and other sympathetic philosophers of the last century. But Mr. Lavater has applied this position in a manner, I think, entirely new, in supposing that the imagination of a sick or dying person, who longs to behold some absent friend or relation, acts on the mind of this absent person so strongly, as to

\* True notion of a spirit. † Physiog. tom. III. p. 163.

produce an idea of the presence of the sick or dying man. This will appear more clearly, and more advantageously, in his own words. *Un malade, un mourant, ou quelqu'un qui se trouve dans un peril imminent, soupire apres son ami absent, apres son frere, ses parens, son epouse : ceux-ci ignorent sa maladie, ses dangers ; ils ne pensent point a lui dans ce moment. Le Mourant, entrainé par l'ardeur de son imagination, perce a travers les murs, franchit les espaces, & aparoit dans sa situation actuelle—en d'autres termes, il donne des signes de sa presence qui approchent de la realité. Une telle apparition est elle corporelle ? rien moins que cela. Le malade, le mourant languit dans son lit, & son ami vogue peut-etre, en pleine santé, sur une mer agitée : la presence réelle devient par consequent impossible. Qu'est-ce donc qui produit cette espece de manifestation ? Quelle est la Cause qui agit dans l'éloignement de l'un, sur les sens, sur la faculté visuelle de l'autre ? C'est l'imagination—l'imagination éperdue d'amour & de desir—Concentrée, pour ainsi dire, dans le foyer de la passion\*.* This hypothesis would explain other pretended appearances ; the effects of an evil eye, the curses of a longing woman, and the success of the operations with waxen figures ; but I do not see how it explains the apparitions of the dead, (for death terminates all bodily affections, *ultra, neque curæ neque gaudio locum*)—without having recourse

\* Id. Ib. p. 164.

to the other theories already mentioned. But if it be allowed, that the imagination of another can produce so wonderful an impression on the mind, how much more easy is it to conceive a man's own imagination imposing delusions on him? There are many moments, when the operations of fancy are extremely fallacious in healthy men; and in nervous diseases, where the patient appears but little altered in the strength of his faculties, there is much transient delirium, and much false imagination. When the fancy is once set in motion, old impressions generally revive, and friends and relations rush upon us; the caprices of association in some persons are unaccountable; and many may cry out with the poet\*, *delirando io vivo*.

One cannot help regretting, that so much ingenuity and attention had not rather been applied to an accurate examination of facts, than to form theories, which only shew how irreconcilable those facts are with reason and experience; but it has generally been found, that an opinion, adopted without sufficient proof, is defended with an earnestness very unfriendly to investigation; and we are going to see such astonishing perversion of facts, and such obstinate adherence to the most extravagant absurdities, that what has hitherto been related will

\* Metastasio.

appear, comparatively, to be wisdom and discernment.

It is an opinion of considerable antiquity, that the bodies of deceased men were sometimes reanimated by demons. The first accounts of this kind are to be found in Phlegon Trallianus\*, and Philostratus Dioscyles. A ridiculous story to the same purpose, was circulated respecting Agrippa: one of his scholars, it was said, got into his study, during his absence, and taking up a book which contained the titles of certain demons, began to read: presently a demon popped his head into the room and asked what was required of him; perceiving the boy frightened, the impudent devil strangled him on the spot. When Agrippa returned, he was, of course, a good deal vexed at the accident; however, with infinite address, he ordered a demon to enter the body immediately, to walk once or twice round the market-place, and then to let the carcase drop, that the boy might appear to have died suddenly. A few other instances of the same kind may be picked out from the legendary writers, but it was not till the sixteenth century, that the bodies reanimated were supposed to do any mischief. Then, in Germany, Dr. Martin Weinrich, a collector of incredible histories, published an account of two *Redivivi*; one was

\* De Mirabilibus.

the shoe-maker of Breslaw, the other was a man of consequence, Cuntius, whose story was lately translated from Dr. More's *Antidotus Adversus Atheismum*, and republished in the *Antiquarian Repertory*. So troublesome and insolent was the revived shoe-maker, that the people whom he distressed, were on the point of leaving their houses, to settle elsewhere(u).

Dr. More thought these narrations so convincing, that he concludes them in triumph with these words: *equidem fateor me tam tardo esse ingenio, ut comminisci planè nequeam, quid hic Atheus excogitaturus sit, in subterfugium sibi et latibulum, contra tam manifestas evidentesque demonstrationes.* When the good doctor calls the infidels with regard to apparitions, atheists, the reader may be apt to smile; but this frightful epithet was nor, with him, an unmeaning term of reproach, as it is with so many persons, in ordinary books, and in ordinary conversation; it was a conclusion from the doctor's system, which he drew in a curious manner, though with abundance of zeal and confidence, at the close of one of his sections, in the performance just quoted; "as it is a maxim in polity," saith he, "that, no Bishop, no King, so in metaphysics, we may say, no Spirit, no God."

Paracelsus found a ready theory in his philosophy, for this species of reanimation; the devil, according to him, can do what he will in his

own kingdom, and he can preserve a dead body for any length of time, by his knowledge of the true balsam. *Quod in Domino non moritur, moritur in diabolo. Jam vero divos in suo regno diabolus facere potest. Quibus rebus homo a putredine preservetur, quovis homine exactius novit, utpote veri balsami gnarus\*.* (v)

This strange delusion prevailed very generally among the modern Greeks, and they knew the remedy for the disturbance, which consisted in publicly burning the carcase of the *vroucolacas*, as they termed the *redivivous*. But the triumph of this absurdity was reserved for an advanced period of the eighteenth century. Somewhere about the year 1730, an alarm began in Hungary, of some houses being haunted, by persons deceased, who sucked the blood of some of the family, during their sleep. The sufferers were sensible of this terrible operation, and commonly recognized the features of the apparition: the Hungarians termed these nocturnal visitors, *Vampires*. In consequence of these practices, the persons sucked became weak and emaciated, the corpse of the Vampire, on the contrary, was found, even after long interment, fresh, florid, and full of blood; sometimes to such a degree, as to pour out blood from the nose, mouth and ears. This extravagance, produced by the

\* Philosoph. Sagac. cap. X.



oppressive dreams of plethoric persons, on the eve of disease, was first published by the Marquis D'Argens, in the Jewish Letters; a striking contrast to his scepticism on some other points, but an inconsistency not uncommon with persons deistically inclined. But the subject soon got into different hands, for the learned Dom Calmet, well known by his critical dissertations on the Bible, published a history of Vampires, rich in absurdity, of which the following passage is a specimen, but it is necessary to add, quoted from Voltaire\*. "In Hungary, two officers, commissioned by the Emperor Charles VI. assisted by the bailiff of the place, and the executioner, went to examine a Vampire, who had been dead for *six weeks*, and who sucked the whole neighbourhood. They found him in his coffin, fresh, lively, with open eyes, and desiring something to eat. The bailiff passed sentence. The executioner tore out the Vampire's heart, after which the Vampire eat no more."

Some questions, apparently puzzling, occur on the subject of those disturbances: how could all the inhabitants of considerable towns be imposed on, in a matter so nearly respecting the peace and safety of each individual, as universally to impute actions to supernatural influence, which perhaps were no more than knavish? How

\* Quest. sur. L'Encyclop. Art. Vampire.

could they be deceived in the solemn and public inspection of the Vampire's body, which always took place? And how could the destruction of a wretched carcase, long dead, become the means of restoring public tranquillity, so as to be ordered by the magistrates? The best explanation is, to shew, by unquestionable facts, how such delusions *have* taken place; this will also elucidate the nature of all the illusions already mentioned. When Tournefort visited the island of Mycone\*, in 1701, the principal town, at which he resided, was disturbed by a *vróucolacas*, or *redivivus*; the consternation was so great, that most of the inhabitants slept in tents, in the market-place: their peace was restored by burning the carcase of the *redivivus*, after a public examination, in which it was declared to be fresh. These are the principal facts, and apparently strong: now let us unveil their origin, by an abstract of Tournefort's observations.

I. Tournefort observes, that the person accused of those disturbances had been quarrelsome during his life, and was murdered privately. So that he was a proper subject of suspicion; supposing the general delusion once established.

II. The *redivivus* was accused of nothing which might not have been practised by ordinary vagabonds; "he was seen to walk in the night

\* Letter III.

" with

“ with great haste; he tumbled about people’s goods, put out their lamps, &c.” The wonders related of the German redivivi are only exaggerations.

III. The story never gained full credit, till the papas, (priests) for their own honour and interest, took it up.

IV. During the examination at the chapel, the popular fury against the deceased carried every thing before it: “ the corpse stunk so offensively, that they were obliged to burn frankincense; but the smoke mixing with the exhalations from the carcase, increased the stench, and began to affect the poor people’s brains. Their imaginations, struck with the spectacle before them, became full of visions. They fancied that a thick smoke arose out of the body; we durst not say it was the smoke of the incense. They were incessantly bawling out vroucolacas (*βρυνκολακας*) \*\*\*\* Several people present averred that the wretch’s blood was extremely red: the butcher swore the body was still warm \*\*\*\* Just at that instant came in a flock of people, loudly protesting they plainly perceived that the body was not grown stiff, when it was carried from the fields to church, to be buried, and that consequently it was a true vroucolacas \*\*\*\* I do not doubt but they would have sworn it did not stink, if we had not been there \*\*\*\* And for us,  
“ who

“ who had got as close to the corpse as we could,  
 “ that we might be more exact in our obser-  
 “ vations, we were almost poisoned by the in-  
 “ tolerable stench that issued from it. When  
 “ they asked us what we thought of this body,”  
 (every one knows that Tournesfort was a phy-  
 sician) “ we told them we believed it to be  
 “ thoroughly dead; but as we were willing to  
 “ cure, or at least not to exasperate their pre-  
 “ judiced imaginations, we represented to them,  
 “ that it was no wonder the butcher should feel  
 “ a little warmth, when he groped among the  
 “ putrid intestines; that it was no extraordinary  
 “ thing for the body to emit fumes, since dung  
 “ turned up will do the same; that as for the  
 “ pretended redness of the blood, it still ap-  
 “ peared, by the butcher’s hands, to be nothing  
 “ but a very foetid, nasty smear.”

V. The devil took care to get into the cellars of those persons who abandoned their houses, in order to drink up their wine.

VI. No watch was kept, nor any proper measures taken to prevent villanous practices.

Upon the whole then, the opinion of a vroucolacas, like the others already examined, appears to be only an hypothesis, formed to account for phænomena, whose causes were not obvious to the people. But if a philosopher had not unluckily been present at this curious transaction, the annals of credulity could scarce have furnished

furnished a stronger proof than this, of the existence of redivivi, consequently of all sorts of demoniacal operations.

It seems also, that when men are unacquainted with the natural cause of a particular appearance, and at the same time, are persuaded of the possibility of diabolical illusions, they will impose even on their own senses, to favour the admission of a theory so interesting to their imaginations.

The miracles of the Abbé Paris, while they afford the strongest proof of this assertion, and while they shew that illusions scarcely credible may prevail in the brightest periods of science and art, require particular attention, as Mr. Hume has affected to compare them with the miracles of our religion; though they were refuted in publications of the time never much known, and now generally forgotten.

The report of these miracles began in 1727, soon after the death of the Abbé Paris, when different persons supposed themselves relieved from indispositions, by employing portions of his clothes, or of the bed on which he died, as relics. A concourse of the diseased, the superstitious, and the curious was made to his tomb, in the church-yard of St. Medard, at Paris, where miraculous cures and sudden conversions were said to take place every hour. But contact with the tomb produced a curious effect on many: they were thrown into convulsions, which

which continued till they thought fit to descend from their station; and this appearance was so common, that the cures and conversions were comparatively little considered; the votaries of the Abbé Paris came to be known by the title of *Convulsionists*, and many persons considered those gambols as the only effect of the miraculous power. A collection of the most remarkable cures, strengthened by the depositions of the friends and medical attendants of the patients, was drawn up by Mr. de Montgeron, a counsellor of the parliament, who had been converted at the tomb, and by him presented to the King. The Archbishop of Paris opposed the authenticity of the miracles, but a report in favour of them was presented to him, certified by twenty-three curés (Vicars) residing in Paris, two Bishops declared for them, in the pulpit, and the Cardinal de Noailles supported them with his authority\*.

The advocates for these miracles insisted chiefly on the curés: the convulsions were objected to them by their enemies, who considered them as demoniacal, which was allowed by some of the convulsionists themselves†, as well as that some indecencies were exhibited at the tomb. One of the patients who was lame of the

\* Priv. Life of Louis XV. Mirac. de M. de Paris. Verité des Mirac. Demontr. par Montg. Jewish Letters.

† Des Vœux, Nouvelles Lettres sur les Mirac. p. 154.

left leg, was said to have hurt the other by tumbling on the tomb, which gave rise to an epigram by the Duchesse de Maine;

Un decroteur a la Royale,  
Du talon gauche estropié,  
Obtint pour grace speciale  
D'être boiteux de l'autre pié.

The infatuation continued, with increasing force, almost five years, during which the controversy was carried on so fiercely, as to occasion several divisions among the defenders of the miracles themselves; such as Augustinists, Vaillantists, Secourists, Discernants, Figurists, Melangists, &c.\* names, says my author, worthy of a place with those of Umbilicists, Iscariotists, Stercorists, Indorfians, Orebiters, Eonians, and other sects equally illustrious. Government at length found it necessary to interpose; the tomb was blocked up and guarded, (for the Abbé Paris produced no miracle efficacious against a fixed bayonet) and Montgeron was imprisoned, very soon after presenting his book. These measures did not stop the controversy, however, or diminish the credit of the miracles: Voltaire says the latter continued for thirty years successively.

It is easy to perceive, that this whole business was contrived to support the party of the appellants, who opposed the Bull Unigenitus,

\* Encycloped. Art. Convulsionnaires.

attempted

attempted to be forced at that time on the Gallican church. This may be collected from the writings of the party \*, who made ample use of so excellent an argument, and who were not wanting, either in artifice or assurance, to carry on their design. They had more engines at work, than this of St. Medard; for similar miracles were worked at the tomb of Mr. Rouffe, an appellant also, who died at Avenay near Rheims, about the same time with Mr. de Paris †. The Jansenists certainly timed their operations well, for miracles were heard of in all places; the miraculous cure of Madame de la Fosse; (which was believed previous to any examination ‡) that at Lyons, and that at Amsterdam, all happened about the same time. These stories were noised about Paris, so that people were disposed even to expect miracles in favour of the appellants: this is evident from the words of Mr. Le Gros, who was a writer for that party §; “that if miracles were necessary, they might be expected.” And all the appellants were eager to declare, that the miracles at St. Medard were performed purposely to support them in their opinions. If this cir-

\* Particularly from the *Consequences qui resultent de ces miracles* in Montgeron's book.

† Mirac de M. L'Abbé de Paris, p. 118, & seq.

‡ Nouv. Lett. p. 190.

§ Nouv. Lett. p. 189.



cumstance throws a doubt on those operations, our suspicions will increase, when Montgeron's own history of his conversion is considered. "I determined," says he\*, "to go every day to the tomb, to observe attentively whatever should occur, resolving to believe nothing but my own eyes; to take the name and residence of every patient, to examine them carefully myself, and to be informed accurately of the nature of their complaints by consulting their medical attendants; in short, to spare no trouble, to discover whether a supernatural agency was exerted at the tomb, or whether there was any deceit. But perceiving at the first glance," he adds, "the attention, the penitence, and the ardour expressed in the countenances of most of those who paid their devotions in that holy place, I was struck with an internal sentiment of respect, *never having seen any body pray so fervently*. I fell on my knees, resting my elbows on the edge of the tomb."——And from the instant of this *sentimental* conversion, it is evident that Mr. de Montgeron's testimony becomes of no value. But the matter does not rest here. Mr. Des Vœux, pastor of the French church at Dublin, in 1740 published *Nouvelles Lettres sur les Miracles de M. Paris*, in which, by a painful examination of the facts, he convicted

\* Mirac. de Convers. p. 10, 11.

Montgeron of false citations\*, of suppressing passages unfavourable to his opinion, and of directly misrepresenting facts. Nay it appeared that some persons, said to have been cured miraculously, retracted every thing that they had advanced: and there were such proofs given of tampering with witnesses, to make them sign what they at least did not know to be true†, and of attempts to deceive the medical persons whose attestations were required, as must destroy every degree of credit that the advocates for those miracles might otherwise deserve.

A miraculous cure, published in the *Nouvelles Ecclesiastiques*, was proved to be a forgery\*: after this detection, the contest was heard of no more, and the influence of the philosophical party increased to such a degree, that it was presumed the age would now be secure from the phrenzy of the most specious delusion. However, in 1778, Dr. Mesmer began to distinguish himself by his operations in *animal magnetism*, which soon became as famous as the miracles of the holy deacon of St. Medard. Paris was the theatre of this wonder-worker (for it seems Philosophy, like the Romans, can only be defeated in its own quarters) and as it was not immediately known,

\* Lett. VI.

† In Anne le Franc's Case, letter VII.

‡ Des Vœux, lett. VII.

that

that Dr. Mesmer's opinions were chiefly borrowed from the exploded hypothesis of Van Helmont, he drew a sufficient concourse of patients to his house, to attract the attention of government. A committee of persons, well known by their philosophical publications, was appointed to examine the merits of this pretended discovery, and their inquiries, which it is unnecessary to repeat in this place, as they may be found in all the periodical publications\*, terminated in this conclusion, "that animal magnetism is a mere chimæra." In fact, whatever may have been the operator's opinion, it is evident that the patients were acted upon by the force of imagination alone, which, however, produced very violent effects, evidently hysterical in the female patients, whom the commissioners observed to be more generally affected than those of the other sex. When the practice was no longer permitted in Paris, it found shelter in the capital of this country, where, though the operations are somewhat varied, facts are not wanting to prove that the principle is still the same.

The pressure of human evils subjects the mind to surprizing acts of weakness, in its attempts to procure consolation or relief: perhaps the most remarkable of these is that confidence, so frequently reposed, for the cure of diseases, in the natural

\* Particularly a very distinct abridg. in the Europ. Mag. for Nov. 1784.

virtues and properties of the body of a man, labouring under the same defects, and susceptible of the same infirmities, with those who fancy themselves relieved by his touch. However, this delusion is not confined to the vulgar of all times, or to the instance before us; it has been patronized by the most respectable writers, and reigned for a considerable time in philosophy. The cures performed by Apollonius, which rest on the single evidence of Philostratus, have been long given up as fabulous, though some of the early christians had the indiscretion to allow the facts, and then to account for them from demoniacal operations; but the philosophic historian, Tacitus, relates a story of this kind, which ought to make his declamatory admirers more modest in their praises of his veracity. While Vespasian resided at Alexandria, he was suddenly endued with the power of working miracles, *multa miracula evenere, quibus celestis favor, et quædam in Imperatorem inclinatio Numinum ostensa est*. A blind man fell at his feet, beseeching him to touch his cheeks and eyes with his imperial spittle: another person lame of one hand (*manu æger*) begged to be honoured with a kick (*ut pede ac vestigio Cæsaris calcaretur*) both persuaded by the authority of Serapis that these operations would remove their disorders. Vespasian suffered himself to be importuned, and then referred the matter to his physicians, who knew very well what to answer;

id

*id fortasse curæ diis, & divino Ministerio Principis lectum*; accordingly the Emperor spits on one of his petitioners, and kicks the other, and both are cured on the spot\*. Strada observes very properly, on this disgraceful story, that there was room enough here for Tacitus to have exercised his talent at conjecture, which he indulges so freely on other subjects; but this perhaps was too easily to be explained, because Apollonius, who was the friend of Vespasian, *happened* to be in Alexandria, at the time of this miracle, and it was readily enough conceived that the Emperor might be his pupil†. The sage historian, therefore, relates the simple matter of fact. Delrio and Morhoff mention the Saludadores of Spain, who cured diseases by the touch, breath, saliva, &c. Morhoff says that Emanuel de Valle de Moura wrote an express treatise concerning them. Another Spaniard, Michael Medina, knew a boy who cured diseased persons by touching them‡. Dr. Willis asserts that he has known scrophulous persons cured, by imposition of hands by the *seventh son of a seventh son*, when all other remedies failed||. The efficacy of the royal touch, in England, was not only asserted by Tooker and Willis, but by Wiseman, whose Treatise on Surgery was the standard book in this country,

\* Histor. lib. IV. † Prolus. II. Histor. p. 71, & seq.

‡ Fien. p. 193; Delrio 24. || Cereb. Anat. p. 159.

till the publication of Dr. Heister's, and by Morhoff, in his *Princeps Medicus*, where he asserts the operation to be miraculous. Wiseman declares expressly, that some of the worst scrophulous cases he had ever met with, yielded to this remedy.

Van Helmont was the principal supporter of that opinion which supposed a magnetic spirit in the human body, by action on which he explained all the phenomena of disease, and all the facts of demonology. Other philosophers contented themselves with believing, in general, that those appearances, and particularly in the cure of disorders, depended on an emanation or transmission of spirits, and it was thought that even the faculties and affections of the mind could be thus transmitted. This was the opinion of Bacon\*, and the foundation of that expression of the poet:

----- Spirits are not finely touch'd,  
But to fine issues. -----

In consequence of this, it was supposed that the sympathy which had subsisted among the parts of an individual, continued after the separation of those parts: hence the cure by sympathy, that is, without application to the parts affected. Lord Verulam alledges his own experience of this method: "The taking away of warts," says he,

\* *Sylv. Sylvar. Cent. X.*

" by

\* by rubbing them with somewhat that afterwards is put to waste and consume, is a common experiment; and I do apprehend it the rather, because of mine own experience. I had from my childhood a wart upon one of my fingers: afterwards when I was about sixteen years old, being then at Paris, there grew upon both my hands a number of warts (at the least an hundred) in a month's space. The English Ambassador's Lady, who was a woman far from superstition, told me one day, she would help me away with my warts; whereupon she got a piece of lard with the skin on, and rubbed the warts all over with the fat side, and amongst the rest, that wart which I had had from my childhood; then she nailed the piece of lard, with the fat towards the sun, upon a post of her chamber window, which was to the south. The success was, that within five weeks space, all the warts went quite away; and that wart which I had so long endured for company. But at the rest I did little marvel, because they came in a short time, and might go away in short time again; but the going away of that which had stayed so long, doth yet stick with me. They say the like is done by the rubbing of warts with a green elder stick, and then burying the stick to rot in muck\*." Thus far the great Lord Verulam. Upon this

\* lb. p. 216.

principle\*, instead of applying salve to a wound, it was applied to the sword which inflicted the injury. Butler did not let this folly escape: he says of Sidrophel

He had a sympathetic powder

That wounds nine miles point-blank would folder.

Willis and Dr. Boulton were both sympathists.

The most curious instance of sympathy that has occurred to me, is contained in a paper of the *Miscellanea Curiosa* (tom. XIV.) A carpenter cut down a tree which grew in the neighbourhood of a gibbet, where a famous thief had been suspended for a considerable time. When the workman came to split the trunk, he was astonished to find, in the very centre of the wood, an exact representation of the gibbet and the malefactor, which remained fair on each side, after he had accomplished the division. He carried one of the impressions to the philosopher in his neighbourhood, who gratified the learned society with this singular instance of sympathy, and the account was published with two very accurate engravings, to satisfy the reader more completely.

The last sympathist and healer by touch, previous to Dr. Mesmer (excepting Leverett, mentioned in the account before referred to) was

\* Sir Kenelm Digby, Rattray, and others wrote on this subject.



Greatrack, whose cures were related by Mr. Boyle, and mentioned by Dr. More, in his preface to the *Saducismus Triumphatus*, as attested by several Fellows of the Royal Society: a relation of his cures was published in the *Philosophical Transactions*, No. 256. These were the fore-runners of animal magnetism, which, after all, probably owed somewhat of its favourable reception, to the strange faculty of discovering subterraneous water, attributed about the same time to Bleton; and animal magnetism would, perhaps, have acquired as strong a party, if it had been unchecked by authority, as any delusion with which we reproach the ruder states of society. For such is the credulous tendency of the mind, that even the present century, notwithstanding the boasted improvements of reason, has proved fruitful in illusions of the most ridiculous nature; nor is it easy to limit the future progress of similar phrenzies, when we consider that at this moment, there is a set of persons among us, who, contrary to all reason and experience, are firmly persuaded that they shall never die\*. (v)

The doctrine of animal magnetism is so notoriously an hypothesis, formed to explain real or pretended appearances, that it is unnecessary to shew its agreement with the general principle. There would be no great difficulty in proving, if it were worth while, that the same talents

\* The Buchanites. See the *Divine Dictionary*, *passim*.

which might have been harmlessly employed in composing a rebus or a paraphrase, have produced very serious perplexities by their application to philosophy. At least nobody will dispute, that the theorist, as well as the poet, may be often said to

----- Give to airy nothing  
A local habitation and a name.

The contemplation of literary absurdity is far from being vain or useless; on the contrary it is an indispensable object, to every one who wishes to make a proper use of books. To be convinced of this, we need only to cast our eyes, on the productions of those men who extract, without doubting, from writers of eminence; where the understanding is shocked by lies of long descent, and blunders of venerable antiquity; where the author is satisfied with having made up a *justum volumen*, and the reader is content, for his own sake, to mistake knowledge of books for knowledge of things.

Demonologists have always asserted, that it is impossible to weaken the credit of their facts without destroying the foundations of history; and it is certain, that the abundant evidence produced in support of manifest contradictions, and physical impossibilities, tends to lessen our confidence in historical narrations. But when we investigate demonological facts a little more closely, when we trace the same history through  
many

many writers, who copy it from each other, or from an original of little authority, their real number is found to be small, and of these few, the greater part has been proved to be fallacious. From the denial of those facts, therefore, nothing can be concluded to the injury of history, however cautious a reader may become, by observing in what manner the same facts are altered, by undergoing the successive efforts of men differing in abilities and dispositions. He may even be tempted to believe, that he discovers the foundation of many recorded enormities, in the passions and weaknesses of the historian: for some men see their own darling vice in all others, as some gouty physicians discover the gout, in every patient who comes under their care.

Lastly, an acquaintance with the histories and arguments of demonologists produces an useful hesitation, in assenting to evidence, however specious; for in doubtful cases, however numerous the witnesses may be, it will always be remembered, how frequently men have shewed themselves determined, to see and believe things invisible and incredible.

## N O T E S.

(A) Page 26. The Romans had a temple dedicated to the Goddess Fever; an inscription has been found, addressed to that divinity—*FEBRI DIVÆ, FEBRI SANCTÆ*. We have seen in our times, *Eloges de la Fièvre Quartaine*.

(B) p. 27. Though Aristotle endeavours to account for dreams in general from natural causes, yet he admits their production in some cases by supernatural agency. All dreams, says he, are not of divine origin, because many of the lower animals dream; but though there be nothing divine, there may be something demoniacal in them. *De Divin. per Somn. C. II.*

(C) p. 27. This was done as a joke. The augurs told him that the chickens would not eat, which was considered as a bad omen: they shall drink then, replied Claudius, and ordered them to be thrown overboard. Others of the Romans laughed at this mode of divination. Cato wondered that one augur could look at another without laughing. Hannibal's keen sarcasm affected both Prusias, (when he was deterred from fighting by the auspices) and the art itself. "Would you rather," said he, "trust a calf's liver than a veteran commander?"

(D) p. 28. Augustus was shamefully superstitious; he not only observed the time of year when his dreams were least favourable and most uncertain, but on a certain day of every year, in consequence of a vision, he begged publicly, stretching out his hand, says Suetonius, to those who reached him a few *asses*. *Suet. in Aug. § 91.*

The same author preserves a very ingenious explanation of an omen which terrified the Emperor. A flash of lightning

ning effaced the letter C, from the inscription of a statue of Augustus. The augurs declared that he would survive this sign only an hundred days, the number denoted by C, and that he should be received among the gods, because *Æsar* the remaining part of the word, denoted a god in the Etruscan language. Id. § 97.

(E) p. 32. See the *Cry from the Desert*, and *Prophetical Warnings of the eternal Spirit by the mouth of his servant John Lacy*. There is a well known story of this man, who was first the protector of those visionaries, and afterwards a prophet himself; that when some of them were taken up, he went to the solicitor general, and told him that the Lord commanded him by his mouth to grant a *Noli Prosequi* in favour of his servants: the Lord knows very well, replied the solicitor general, that it is not in my power to grant a *Noli Prosequi*.

(F) p. 35. Perhaps this is not quite exact, for I quote Martin from memory, and the resemblance between Virgil and him may be closer. Virgil, we see, owned that his priest *dreamed*, but according to Martin, *his* friend was supposed to be awake.

(G) p. 43. Butler ridicules this among other magical doctrines, in Hudibras's conference with Sydrophele.

Th' intelligible world, he kn<sup>ew</sup>  
 And all men dream on't, to be true;  
 That in this world there's not a wart,  
 That has not there a counterpart;  
 For can there on the face of ground,  
 An individual beard be found,  
 That has not, in a foreign nation,  
 A fellow of the self-same fashion;  
 So cut, so colour'd, and so curl'd,  
 As those are in th' inferior world?

He

He has characterized Agrippa rather too strongly, if the fourth book of the Occult Philosophy be spurious ;

Sir Agrippa, for profound  
And solid lying much renown'd. C. I.

(H) p. 46. Wierus had a controversy with a clergyman of Stutgard, named *Brentius*, on the subject of hail-storms. *Brentius* had advanced, in a sermon printed in Wierus's *Liber Apologeticus*, that although witches did not cause hail by their own power, (for he believed it to be of diabolical origin) and although the devil imposed on them, by making them believe *that* to be performed at their desire, which he should do at any rate, yet they were objects of punishment, because they had consented to the mischief. Wierus replied very properly, that the law did not judge of intentions, but of facts : *Brentius* rejoined that the consent of a witch to the devil's exciting a hail-storm, was a *comatus perfectus*, which Wierus denied. The peasants continued to apprehend and procure the condemnation of witches, whenever their hay was damaged by hail. Observe the inconsistency of human reason : A person who has the power of raising violent storms, of darting the thunder-bolt, and overturning the dwellings of men, cannot rescue herself from the hands of a petty constable.

(I) p. 50. It appears from Lucian's original story of *the ass*, that ointments were in use among the supposed Grecian witches, in order to their conveyance to the witch-meetings. Apuleius has improved so far upon him, in the story of the murdered bladders, (which Cervantes borrowed for Don Quixote) that the ass of the Greek must give place.

(K) p. 51. In 1695, Richard Dugdale was said to have given his soul to the devil, that he might become the best dancer in Lancashire, but the fraudulent demon affected him with convulsions. Some ministers who attended him  
held

held very curious dialogues with him. Dr. Hutchinson furnishes the following specimen of their judicious raillery.

“ What, Satan ! is this the dancing, that Richard gave  
 “ himself to thee for ? Canst thou dance no better ?  
 “ Ranfack the old records of past times, and places in thy  
 “ memory : canst thou not there find out some better way  
 “ of trampling ? Pump thine invention dry : cannot that  
 “ univerfal seed plot of subtle wiles and stratagems  
 “ spring up one new method of cutting capers ? Is this  
 “ the top of skill and pride, to shuffle feet and brandish  
 “ knees thus, and to trip like a doe, and skip like a  
 “ squirrel ? And wherein differ thy leapings from the  
 “ hoppings of a frog, or bouncings of a goat, or friskings  
 “ of a dog, or gesticulations of a monkey ? And cannot  
 “ a palsy shake such a loose leg as that ? Dost thou not  
 “ twirl like a calf that has the turn, and twitch up thy  
 “ houghs just like a spring-hault tit ? ”

Hutchinson, p. 162.

(L) p. 55. Possessions frequently spread in monasteries, like hysterical complaints, and there appears in reality no distinction between them, in such cases. See Wierus *de Maleficio afflicti*, (p. 299, & seq.) where one very grievous symptom is taken notice of ; *Si quando he in arreptam matulam mejere tentarent, ea violenter erepta, lotio conspurcabant lectum*. It was in 1634, under the administration of Cardinal Richlieu, that the hysterics of the nuns of Loudun occasioned the execution of Urban Grandier. The Duke of Lauderdale has left his testimony to the bungling performance of this deception, in Baxter's Essay on Spirits. Of several physicians who examined the possessed, Dr. Duncan of Saumur was the only one who had the discernment or the courage to declare that there was nothing preternatural in their disease. He proved his assertion by some publications, the heads of which may be seen in the *Causæ Celebres*, but as it was very well known that the devil had spoke Latin, his reasons were disregarded, and

and Grandier was burnt alive. When this unfortunate man was led to execution, a bee was observed to fly about his head; this was supposed to be his *familiar*.

(M) p. 62. Baxter gives two instances of a judge examining, from the bench, whether a poor illiterate creature could repeat the Lord's prayer: it was proved, according to this author, that a witch cannot rehearse it without blundering.

(O) p. 71. Serenus is supposed to have invented the famous Abracadabra. Wier. p. 406.

(N) p. 68. There is a grave relation in Delrio, of a witch being shot flying, by a Spanish centinel, at the bridge of Nieulet, near Calais, after that place was taken by the Spaniards. The soldier saw a black cloud advancing rapidly, from which voices issued; when it came near he fired into it; immediately a witch dropped. This is *undoubted proof* of the meetings! Disq. Mag. p. 708.

(P) p. 77. Van Helmont, Bodinus, Strozza and Luther imputed thunder and meteors to the devil.

(Q) p. 78. St. Augustine supposes the prophets, mentioned in the sixteenth chapter of the Acts of the Apostles, to have been a Ventriloquist, without any apparent foundation. The Pythia at Delphi was supposed to be a Ventriloquist, receiving inspiration from certain fissures in the earth, as Cicero informs us (a doctrine of which Swift has made great use). *In Mulieribus*, says Wierus, (p. 140) *Sonus horum vaticiniorum ex genitalibus partibus edebatur et audiebatur*. The same author adds, *Quin et Tertullianus, auctor gravissimus, affirmat se ventri loquas vidisse feminas, e quarum pudendis vocula quædam dum sedebantur excitabatur, respondebatque sciscitantibus*. Denique *Celius Ludovicus, patrum nostrorum memoria feminam se ventriloquam crebro vidisse Rhodii, Italiæ urbe & patria sua, scribit: ex cujus pudendis vocem immundi spiritus*



*spiritus pertenuem quidem, sed tamen prorsus intelligibilem, sæpe audierit, de rebus præteritis aut præsentibus mirificam: at de futuris plerumque incertam, sæpe etiam vanam & mendacem!*—

Our modern ventriloquists no longer pretend to the gift of prophecy, but they possess the extraordinary power of directing articulate sounds, so as to produce an appearance of their issuing from any object within the compass of the voice. I do not find that any one attempts to teach this curious art.

From the surprizing deceptions produced by ventriloquism many persons have hoped to explain the facts of demonology; but the talent seems to be rare, and every witchmonger cannot command an operator at pleasure. In the affair of Cock-lane I think the supposition unsatisfactory, because I have never heard that ventriloquists could imitate knocking and scratching by the voice alone.

Diderot appears to have taken the idea of his *Bijoux indiscrets* from Tertullian's *sympliciorum*.

(R) p. 80. Dee's Conferences with Spirits.] Those visions were evidently designed, by a train of indecency, to accomplish a community of wives between Kelly and Dee; an event which took place after solemn invocations of the Deity for his blessing on this connection, supernaturally ordained, and after the strongest expressions of piety by all parties. This, it must be seen, destroys the credit of the book. I find Dr. Dee in the list of the Wardens of Manchester. Probably he did not pass for a conjurer before his preferment.

(T) p. 81. Addison's and Blackstone's faith in apparitions was gratuitous, and perhaps more ridiculous than that of the stoutest demonologists. Those great men believed the possibility, and even the reality of such phenomena, without crediting any particular instance. Upon  
this

this plan there is nothing incredible. Reject the evidence of others, and our own experience, as unnecessary to influence our belief, and what principle remains to determine us?

(U) p. 85. It is astonishing to observe how far human pride has carried its claims to supernatural influence. Every man, whose mind was more restless than usual, believed himself to be assisted by a genius, and this word, which at present only denotes a certain activity of intellect, signified, for a long time, the action of an invisible and superior being. There were geniuses of cities and kingdoms, as well as of men. In the last century, it was very common to say, when a great man gave way unexpectedly to opposition, that his genius was over-awed by that of another. Such expressions in Clarendon and others of that time, were not figurative, but implied the superior vigour of the imagination, or (in Lord Verulam's language) *of the transmitted spirits*, in one person over another. Every one knows the noble reply made by the Marechale D'Ancre, on her trial, when she was accused of sorcery, on account of her influence over the Queen-Mother. The Romans perhaps carried this extravagance beyond all ancient nations, in supposing a particular divinity to preside over almost every natural action; (although our astrologers are equal with them, in assigning a planet to govern every member of the body) they had however the wonderful good fortune to make their superstition instrumental in preserving order in the state, and courage in the army; an art which has not descended to their posterity, although they retain an ample share of the *means*. For Petronius's *Bon Mot* respecting the Neapolitans does not appear unjust, even at this distance: *nostra regio tam plena est numinibus, ut facilius passis Deorum quam hominum invenire.*

(V) p. 86. A very extraordinary history of the regeneration of a thief, was published, by a grave physician, in  
the

the *Miscellanea Curiosa*. A malefactor was executed, of whose body the doctor got possession for the purpose of dissection. After disposing of the other parts of the body, he ordered his Assistant to pulverize part of the cranium, which was a remedy at that time admitted in dispensaries. The powder was left in paper, on the table of the museum, where the assistant slept. About midnight he was awaked by a noise in the room, which obliged him to rise immediately: the noise continued about the table, without any visible agent, and at length he traced it to the powder, in the midst of which he now beheld, to his unspeakable dismay, a small head with open eyes staring at him; presently two branches appeared, which formed into the arms and hands; then the ribs became visible, which were soon clothed with muscles and integuments; next, the lower extremities sprouted out, and when they appeared perfect, the puppet, (for his size was small) reared himself on his feet; instantly his clothes came upon him, and he appeared in the very cloak he wore at his execution. The affrighted spectator, who stood hitherto mumbling his prayers with great application, now thought of nothing but making his escape from the revived ruffian; but this was impossible; for the apparition planted himself in his way, and after divers fierce looks and threatening gestures—opened the door and went out. No doubt the powder was missing next day.

This story was published by a society under the imperial protection, during the age of Louis XIV.

(X) p. 85. The most curious hypothesis on this subject is that of Marcus Marci, worthy to rank with the *ειδωλα* of Democritus, and Dr. More's *Immaterial Extensum*. Marci was a physician and imperial counsellor at Prague, who held that ideas are substantial, and may inhere in the constituent atoms of their subject, although its organization be destroyed. Thus spectres and redivivi were explained, without any other difficulty than that of believing

the theory. It was a question among philosophers of the last century, how the raining of frogs could be explained; for that frogs were rained nobody presumed to doubt, before Rhedi. Marci roundly affirmed that the *ideas* of frogs were brought down by the rain, and that they put on a covering of mud, after their descent. This rain of ideas is a thought that would have been much celebrated in a poet. Sterne has hit on something like it, but the conge-lation of words, which furnishes the subject of two very amusing papers in the Tatler, is a stretch of fancy capable of making any poet's fortune. What additional reason, since the time of Cicero, for that observation, *nihil tam absurdé dici possit, quod non dicatur ab aliquo philosophorum!* That singular and beautiful appearance, the Fata Morgana, was a happy confirmation of Marci's hypothesis. He supposed it to consist of the ideas of dead animals.

Dr. King, in his useful Transactions, takes notice of a shower of fishes, in Kent, recorded in No. 243 of the Philosophical Transactions.

(Y) p. 103. When this paragraph was written, the author did not expect to find his sentiments so speedily confirmed, by the public performance of a solemn exorcism, in one of the first cities of this kingdom. On the thirteenth of June, 1788, George Lukins of Yatton in Somersetshire, was exorcised in the temple church, at Bristol, and delivered from the possession of seven devils, by the efforts of seven clergymen. An account of his deliverance was published in several of the public papers, authenticated by the Rev. Mr. Easterbrook, vicar of the temple church in Bristol, from which I extract a few particulars.

Lukins was first attacked by a kind of epileptic fit, when he was going about acting Christmas plays, or mummeries: this he ascribed to a blow given by an invisible hand. He was afterwards seized by fits, during which, he declared with a roaring voice that he was the devil, and sung different songs in a variety of keys. The fits always  
began

began and ended with a strong agitation of the right hand. He frequently uttered dreadful execrations during the fits. The whole duration of his disorder was eighteen years.

At length, viz. in June 1788, he declared that he was possessed by seven devils, and could only be freed by the prayers (*in faith*) of seven clergymen. Accordingly the requisite force was summoned, and the patient sung, swore, laughed, and barked, and treated the company with a ludicrous parody on the *Te Deum*. These astonishing symptoms resisted both hymns and prayers, till a *small, faint voice* admonished the ministers to adjure. The spirits, after some murmuring, yielded to the adjuration, and the happy patient returned thanks for his wonderful cure. It is remarkable, that during this solemn mockery, the fiend swore "by his infernal den," that he would not quit his patient; an oath, I believe, no where to be found but in the Pilgrim's Progress, from which Lukins probably got it.

Very soon after the first relation of this story was published, a person, well acquainted with Lukins, took the trouble of undeceiving the public with regard to his pretended disorder, in a plain, sensible narrative of his conduct. He asserts that Lukins's first seizure was nothing else than a fit of drunkenness; that he always foretold his fits, and remained sensible during their continuance; that he frequently saw Lukins in his fits, "in every one of which, except in singing, he performed not more than most active young people can easily do;" that he was detected in an imposture with respect to the clenching of his hands; that after money had been collected for him, he got very suddenly well; that he never had any fits while he was in St. George's Hospital, in London; nor when visitors were excluded from his lodgings, by desire of the author of the Narrative; and that he was particularly careful never to hurt himself by his exertions during the paroxysm.

Is it for the credit of this philosophical age, that so bungling an imposture should deceive seven clergymen

into a public act of exorcism? This would not have passed even on the authors of the *Malleus Maleficarum*, for they required signs of supernatural agency, such as the suspension of the possessed in the air, without any visible support, or the use of different languages, unknown to the demoniac in his natural state.

*Manferunt, bodieque manant vestigia ruris.*

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LETTER *on* ATTRACTION *and* REPULSION; *communicated by* Dr. PERCIVAL, *October 11, 1786.*

DEAR SIR,

**I** SHALL think myself honoured by your communication of the following experiments and observations to the Manchester Literary Society, if you think them worth their attention.

THE waving motion of oil and water contained in a glass suspended and vibrated in strings, may be accounted for without considering any repulsion or difference of gravity between the two fluids. To prove whether a greater difference of specific weight would increase the motion, I tried quicksilver and water, and found that in this case no waving motion was perceptible. I then tried milk and water,  
whose

whose weights are nearly alike; also water tinged with cochineal at the bottom, and clear water above; and observed that the motion in these was at least as great as that of the oil and water. This led me to suspect that water alone would move in the same manner, and to make the motion perceptible, I dropped into the glass some powdered yellow ochre during its vibration, which following the agitation of the water, rendered it plainly visible. The glass was then tied to a slip of wood, by which means I could move it with greater velocity in the same arc: this caused the waving motion to be so strong as to make the water roll higher on one side of the surface than the other. Lastly, a cylinder of wood was suspended by its axis in a bent wire, and the vibration caused a motion similar to that of the fluids.

From these experiments, I conclude that the waving motion is produced by the difference of velocity of the lower and higher parts of the fluid, the higher endeavouring to return sooner than the lower. The higher part of the fluid may be considered as the ball of a shorter pendulum than the lower, and the fluidity of the water, or oil, enables its several parts to move as freely as the cylinder of wood which rolls upon its axis, because the center of gravity and of oscillation do not coincide. The principle is thus explained in Enfield's Institutes of Natural

“ Philosophy; it is easy to conceive that in a pen-  
“ dulum there must be some one point, on each  
“ side of which, the momenta of the several parts  
“ of the pendulum will be equal, or in which  
“ the whole gravity might be collected without  
“ altering the time of its vibrations. This  
“ point, which is called the center of oscil-  
“ lation, is different from the center of gra-  
“ vity: for if a plane, perpendicular to the string  
“ of the pendulum, be conceived to pass through  
“ the center of the ball, bisecting it, the velo-  
“ city of the lower half, and consequently its  
“ momentum, will in vibration be greater than  
“ that of the upper half: consequently, the cen-  
“ ter of oscillation must be lower than the center  
“ of gravity; and a plane passing through the  
“ center of oscillation will divide the ball into  
“ two unequal parts, so that the greater quan-  
“ tity of matter above it shall compensate for  
“ the greater velocity below it, and the mo-  
“ menta on each side be equal. If the pen-  
“ dulum be an inflexible rod, every where of  
“ equal size, it is found that the distance of  
“ the center of oscillation from the point of  
“ suspension is two thirds of the length of the  
“ rod. If, whilst a pendulum is in motion, it  
“ meets with an obstacle at its center of oscilla-  
“ tion sufficient to stop it, the whole motion  
“ of the pendulum will cease at once without  
“ any jarring; for the obstacle resists equal  
“ momenta



“momenta above and below this point.” Now gravitation, which is the obstacle to the above-mentioned vibrating cylinder, acts upon its axis; and because the lower half has more velocity which is not counterbalanced by quantity of matter above, a waving motion is produced. The reason that the upper surface remains parallel to the top of the glass is, because a body revolving about a center has a tendency to recede from that center, so that a glass may be revolved in a plane perpendicular to the horizon without losing any of the water. And unless the waving motion when the glass is vibrated be very violent, it cannot overcome the difference of specific weight so as to cause an undulation of the upper surface, as appears by the experiment of quicksilver and water, where the weight of the quicksilver, compared with water, renders its waving motion on the surface as imperceptible as that of the water or oil, having air only in the upper part of the glass.

Drops of water rolling over the leaves of colewort are prevented from adhering to the surface by a blue powder, which covers the leaves of that and various other plants, for if the powder be wiped off the water will adhere. The leaves of honey-suckles and barbery trees are blue on one side only, and the water adheres to the green side and not to the blue. If the sur-

face of a pond be struck with a stick, numerous globules of water roll over without breaking, whilst they pass several yards from the place where the water was struck. In these cases of apparent repulsion I suppose that every drop of water surrounded with air becomes globular by the cohesion of its own particles, and unless its weight or contact with other surfaces be sufficient to overcome its cohesion, and displace the air adhering both to the drop and to the surface which it falls upon, it retains its form and cannot unite with them.

Soap bubbles will roll over or rebound from a carpet, though they be filled with smoke, which makes them heavier than when blown with clear air. Also pins may be thrust through them, and even the small end of a tobacco pipe, so as to blow a smaller bubble within the larger without its immediately breaking: but if a bubble fall upon a smooth plain surface, it instantly breaks.

I have sometimes been amused with blowing bubbles with inflammable air, and by attaching to them a small circle of paper and fine thread or raw silk, could hold them suspended in the air for a considerable time. Another amusing experiment was to fix to the inflammable air-bubble a small slip of nitred paper, to the side of which and near the top a grain of gun-powder was annexed. The small end of the  
paper

paper was lighted, and burning up to the gunpowder during its ascent, it exploded, and at the same instant fired the inflammable air.

Two corks, or other light bodies, swimming on water, and having been previously moistened, seem to attract each other. The same thing happens if they are not moistened, but they depress the surface of the water by lying upon it when the water does not wholly adhere to them: but if one be moist and the other dry, they recede from each other; and if a dry one be driven against the side of the vessel containing the water, it is repelled in a manner very much resembling the reaction of elastic bodies. In both the cases where the corks approach towards each other, the surface of the water is raised or depressed by the adhesion of a circle of water to the cork, which also attracts other particles till the gravitation and cohesion are equally balanced as in capillary tubes; and when these circles of attracted water meet, and that in parallel situations, they attract each other, and uniting, endeavour to form one circle, as two bubbles or drops of water unite and form one larger; this brings the corks together, which would also unite and form one larger cork were they not prevented by the strength of cohesion between their own particles. But when one raises and the other depresses the water, each cork attracts  
its

its water from the level surface to complete its circle, the level surface being nearer to each circle than they are to each other, and which may be attracted without either elevating the one or depressing the other. This water, therefore, comes between and pushes them asunder.

In these instances, repulsion is accounted for by the attraction of intervening fluids, and perhaps the elasticity of the air, electricity, and all other elastic fluids may be explained in the same manner, that is, by supposing the mixture of a system of fluids of which some are capable of permeating glass and other solids, as light, heat, magnetism, &c. so that when air for instance is condensed in a vessel, the finer fluids are forced through the sides, and suffer the particles of air to approach nearer together. Or if the electrical fluid is forced upon one surface of glass, a finer fluid or system of finer fluids, which constitute its elasticity, are pressed out and rarify the other uninsulated surface: but without new and decisive experiments, this hypothesis will not be easily adopted. "Yet, if theory can be so framed  
" as really to suit all the facts, it has all the  
" evidence of truth that the nature of things can  
" admit. And even very lame and imperfect  
" theories are sufficient to suggest useful experiments, which serve to correct those theories,  
" and give birth to others more perfect."

This

This quotation, from so great an authority as Dr. Priestley, furnishes an excellent apology for the imperfect attempts of

DEAR SIR,

Your most obedient humble Servant,

WIRKSWORTH,  
AUGUST 22, 1786.

A. BENNET,  
CURATE of WIRKSWORTH.

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ESSAY *on the* DRAMATIC WRITINGS of MAS-  
SINGER. By JOHN FERRIAR, M. D.

MANCHESTER, OCTOBER 25, 1786.

----- Res antiquæ laudis et artis  
Ingredior, sanctos ausus recludere fontes.

VIRG.

IT might be urged, as a proof of our possessing a superfluity of good Plays in our language, that one of our best dramatic writers is very generally disregarded. But whatever conclusion may be drawn from this fact, it will not be easy to free the public from the suspicion of caprice, while it continues to idolize Shakespeare, and to neglect an author not often much inferior,

inferior, and sometimes nearly equal to that wonderful poet. Massinger's fate has indeed been hard, far beyond the common topics of the infelicity of genius. He was not merely denied the fortune for which he laboured, and the fame which he merited; a still more cruel circumstance has attended his productions: literary pilferers have built their reputation on his obscurity, and the popularity of their stolen beauties has diverted the public attention from the excellent original.

An attempt was made in favour of this injured poet, in 1761, by a new edition of his works, attended with a critical dissertation on the old English Dramatists, in which, though composed with spirit and elegance, there is little to be found respecting Massinger. Another edition appeared in 1773, but the poet remained unexamined. Perhaps Massinger is still unfortunate in his vindicator.

The same irregularity of plot, and disregard of rules, appear in Massinger's productions, as in those of his contemporaries. On this subject, Shakespeare has been so well defended, that it is unnecessary to add any arguments in vindication of our poet. There is every reason to suppose, that Massinger did not neglect the ancient rules from ignorance, for he appears to be one of our most learned writers (notwithstanding the  
insipid

insipid sneer of Anthony Wood\*;) and Cartwright, who was confessedly a man of great erudition, is not more attentive to the unities, than any other poet of that age. But our author, like Shakespeare, wrote for bread: it appears, from different parts of his works†, that much of his life had passed in slavish dependence, and penury is not apt to encourage a desire of fame.

One observation, however, may be risked, on our irregular and regular plays; that the former are more pleasing to the taste, and the latter to the understanding: readers must determine, then, whether it is better to feel, or to approve. Massinger's dramatic art is too great, to allow a faint sense of propriety to dwell on the mind, in perusing his pieces; he inflames or soothes, excites the strongest terror, or the softest pity, with all the energy and power of a true poet.

But if we must admit, that an irregular plot subjects a writer to peculiar disadvantages, the force of Massinger's genius will appear more evidently, from this very concession. The interest of his pieces is, for the most part, strong and well defined; the story, though worked up to a studied intricacy, is, in general, resolved with as much ease and probability as its nature will per-

\* *Athenæ Oxon.* vol. I.

† See particularly the Dedication of the *Maid of Honour*, and *Great Duke of Florence*.

mit ; attention is never disgusted by anticipation, nor tortured with unnecessary delay. These characters are applicable to most of Massinger's own productions ; but in those which he wrote jointly with other dramatists, the interest is often weakened, by incidents, which that age permitted, but which the present would not endure. Thus, in the *Renegado*\*, the honour of Paulina is preserved from the brutality of her Turkish master, by the influence of a relic, which she wears on her breast : in the *Virgin Martyr*, the heroine is attended, through all her sufferings, by an angel disguised as her page ; her persecutor is urged on to destroy her, by an attendant fiend, also in disguise†. Here our anxiety for the distressed, and our hatred of the wicked, are completely stifled, and we are more easily affected by some burlesque passages which follow, in the same legendary strain. In the last quoted play, the

\* This Play was written by Massinger alone.

† The idea of devil-servants is not new in English literature. Giraldus Cambrensis, in his *Description of Wales*, mentions a gentleman, named Stakepool, in the county of Pembroke, who had a demon in disguise for his steward. He was a faithful, diligent devil (*bonus œconomus*) and his only peculiarity was that he never went to church. Another demon, less conscientious, attached himself to an Archbishop (*in Dacia*, saith Giraldus, *nostris diebus*) under the form of a clergyman, and was a particular favourite of the good Prelate, till he accidentally betrayed himself. Cambdeni Angl. Normann. &c. Hist. p. 835.

attendant



attendant angel picks the pockets of two debauchees, and Theophilus overcomes the devil by means of a cross, composed of flowers which Dorothea had sent him from paradise.

The story of the Bondman is more intricate than that of the Duke of Milan, yet the former is a more interesting play; for in the latter, the motives of Francisco's conduct, which occasions the distress of the piece, are only disclosed in narration, at the beginning of the fifth act: we therefore consider him, till that moment, as a man absurdly and unnaturally vicious: but in the Bondman, we have frequent glimpses of a concealed splendour in the character of Pisander, which keep our attention fixed, and exalt our expectation of the catastrophe. A more striking comparison might be instituted between the Fatal Dowry of our author, and Rowe's copy of it in his Fair Penitent; but this is very fully and judiciously done, by the author of the Observer\*, who has proved sufficiently, that the interest of the Fair Penitent is much weakened, by throwing into narration what Massinger had forcibly represented on the stage. Yet Rowe's play is rendered much more regular by the alteration. Farquhar's Inconstant, which is taken from our author's Guardian, and Fletcher's Wild-goose Chase, is considerably less

\* No. 88, 89, 90.

elegant and less interesting, by the plagiarist's indiscretion; the lively, facetious Durazzo of Massinger is transformed into a nauseous buffoon, in the character of Old Mirabel.

The art and judgment with which our poet conducts his incidents are every where admirable. In the Duke of Milan, our pity for Marcelia would inspire a detestation of all the other characters, if she did not facilitate her ruin by the indulgence of an excessive pride. In the Bondman, Cleora would be despicable when she changes her lover, if Leosthenes had not rendered himself unworthy of her, by a mean jealousy. The violence of Almira's passion, in the *Very Woman*, prepares us for its decay. Many detached scenes in these pieces possess uncommon beauties of incident and situation. Of this kind, are the interview between Charles V. and Sforza\*, which, though notoriously contrary to true history, and very deficient in the representation of the Emperor, arrests our attention, and awakens our feelings in the strongest manner; the conference of Matthias and Baptista, when Sophia's virtue becomes suspected†; the pleadings in the *Fatal Dowry*, respecting the funeral rites of Charolois; the interview between Don John, disguised as a slave, and his mistress,

\* Duke of Milan, Act II. † Picture.

to whom he relates his story\*; but, above all, the meeting of Pisander and Cleora†, after he has excited the revolt of the slaves, in order to get her within his power. These scenes are eminently distinguished by their novelty, correctness, and interest; the most minute critic will find little wanting, and the lover of truth and nature can suffer nothing to be taken away.

It is no reproach of our author, that the foundation of several, perhaps all of his plots may be traced in different historians or novellists; for in supplying himself from these sources, he followed the practice of the age. Shakespeare, Johnson, and the rest, are not more original, in this respect, than our poet; if Cartwright may be exempted, he is the only exception to this remark. As the minds of an audience, unacquainted with the models of antiquity, could only be affected by immediate application to their passions, our old writers crowded as many incidents, and of as perplexing a nature as possible, into their works, to support anxiety and expectation to their utmost height. In our reformed tragic school, our pleasure arises from the contemplation of the writer's art; and instead of eagerly watching for the unfolding of the plot, (the imagination being left at liberty by the simplicity of the action,) we consider

\* A Very Woman.

† Bondman.

whether it be properly conducted. Another reason, however, may be assigned for the intricacy of those plots, namely, the prevailing taste for the manners and writings of Italy. During the whole of the sixteenth, and part of the seventeenth century, Italy was the seat of elegance and arts, which the other European nations had begun to admire, but not to imitate. From causes which it would be foreign to the present purpose to enumerate, the Italian writers abounded in complicated and interesting stories, which were eagerly seized by a people not well qualified for invention\*; but the richness, variety and distinctness of character which our writers added to those tales, conferred beauties on them which charm us at this hour, however disguised by the alterations of manners and language.

Exact discrimination and consistency of character appear in all Massinger's productions; sometimes, indeed, the interest of the play suffers by his scrupulous attention to them. Thus, in the *Fatal Dowry*, Charolois's fortitude and determined sense of honour are carried to a most unfeeling and barbarous degree; and Francisco's villainy, in the *Duke of Milan*, is cold and con-

\* Cartwright and Congreve, who resemble each other strongly in some remarkable circumstances, are almost our only dramatists who have any claim to originality in their plots.

siderate beyond nature. But here we must again plead the said necessity under which our poet laboured, of pleasing his audience at any rate. It was the prevailing opinion, that the characters ought to approach towards each other, as little as possible. This was termed *art*, and in consequence of this, as Dr. Hurd observes\*, some writers of that time have founded their characters on abstract ideas, instead of copying from real life. Those delicate and beautiful shades of manners, which we admire in Shakespeare, were reckoned inaccuracies by his cotemporaries. Thus Cartwright says, in his verses to Fletcher, speaking of Shakespeare, whom he undervalues, "*nature was all his art.*"

General manners must always influence the stage; unhappily, the manners of Massinger's age were pedantic. Yet it must be allowed that our author's characters are less abstract than those of Johnson or Cartwright, and that, with more dignity, they are equally natural with those of Fletcher. His conceptions are, for the most part, just and noble. We have a fine instance of this in the character of Dioclesian, who, very differently from the ranting tyrants, by whom the stage has been so long possessed, is generous to his vanquished enemies, and persecutes from policy as much as from Zeal. He attracts our

\* Essay on the Provinces of the Drama.

respect, immediately on his appearance, by the following sentiments;

----- In all growing empires,  
 E'en cruelty is useful; some must suffer,  
 And be set up examples, to strike terror  
 In others, tho' far off; but when a state  
 Is rais'd to her perfection, and her bases  
 Too firm to shrink or yield, we may use mercy,  
 And do't with safety. VIRGIN MARTYR, Act I.

Sforza is an elevated character, cast in a different mould: brave, frank and generous, he is hurried, by the unrestrained force of his passions, into fatal excesses in love and friendship. He appears with great dignity before the Emperor, on whose mercy he is thrown, by the defeat of his allies, the French, at the battle of Pavia. After recounting his obligations to Francis, he proceeds,

----- If then, to be grateful  
 For courtesies receiv'd, or not to leave  
 A friend in his necessity, be a crime  
 Amongst you Spaniards -----  
 ----- Sforza brings his head  
 To pay the forfeit. Nor come I as a slave,  
 Pinion'd and fetter'd, in a squalid weed,  
 Falling before thy feet, kneeling and howling  
 For a foretall'd remission: that were poor,  
 And would but shame thy victory; for conquest  
 Over base foes, is a captivity,  
 And not a triumph. I ne'er fear'd to die,  
 More than I wish'd to live. When I had reach'd  
 My ends in being a Duke, I wore these robes,  
 This crown upon my head, and to my side  
 This sword was girt: and witness truth, that now  
 'Tis in another's power when I shall part

With

With them and life together, I'm the same :  
 My veins did not then swell with pride, nor now  
 They shrink with fear.

DUKE OF MILAN, A& III. Sc. 2.

In the scene where Sforza enjoins Francisco to dispatch Marcelia, in case of the Emperor's proceeding to extremities against him, the poet has given him a strong expression of horror at his own purpose. After disposing Francisco to obey his commands without reserve, by recapitulating the favours conferred on him, Sforza proceeds to impress him with the blackest view of the intended deed ;

----- Thou must swear it,  
 And put into thy oath all joys and torments,  
 That fright the wicked, or confirm the good,  
 Not to conceal it only, (that is nothing)  
 But whensoever my will shall speak, strike now,  
 To fall upon't like thunder.

----- Thou must do  
 What no malevolent star will dare to look on,  
 It is so wicked : for which men will curse thee,  
 For being the instrument, and the blest angels  
 Forsake me at my need, for being the author :  
 For 'tis a deed of night, of night, Francisco,  
 In which the memory of all good actions  
 We can pretend to, shall be buried quick ;  
 Or, if we be remember'd, it shall be  
 To fright posterity by our example,  
 That have outgone all precedents of villains  
 That were before us. Ib. A& I. Sc. ult.

If we compare this scene, and especially the passage quoted, with the celebrated scene be-

tween King John and Hubert, we shall perceive this remarkable difference; that Sforza, while he proposes to his brother-in-law and favourite, the eventual murder of his wife, whom he idolizes, is consistent and determined; his mind is filled with the horror of the deed, but borne to the execution of it by the impulse of an extravagant and fantastic delicacy: John, who is actuated solely by the desire of removing his rival in the crown, not only fears to communicate his purpose to Hubert, though he perceives him to be.

A fellow by the hand of nature mark'd,  
Quoted, and sign'd to do a deed of shame;

But after he has sounded him, and found him ready to execute whatever he can propose, he only hints at the deed. Sforza enlarges on the cruelty and atrocity of his design; John is afraid to utter *his*, in the view of the sun: nay, the sanguinary Richard hesitates in proposing the murder of his nephews to Buckingham. In this instance then, as well as that of Charolois, our poet may seem to deviate from nature, for ambition is a stronger passion than love, yet Sforza decides with more promptness and confidence than either of Shakespeare's characters. We must consider, however, that timidity and irresolution are characteristics of John, and that Richard's hesitation appears to be assumed, only in order to transfer the guilt and odium of the action to Buckingham.

It



It was hinted before, that the character of Pisander, in the *Bondman*, is more interesting than that of Sforza. His virtues, so unsuitable to the character of a slave, the boldness of his designs, and the steadiness of his courage, excite attention and anxiety in the most powerful manner. He is perfectly consistent, and, though lightly shaded with chivalry, is not deficient in nature or passion. Leosthenes is also the child of nature, whom perhaps we trace in some later jealous characters. Cleora is finely drawn, but to the present age, perhaps, appears rather too masculine: the exhibition of characters which should wear an unalterable charm, in their finest and almost insensible touches, was peculiar to the prophetic genius of Shakespeare\*. Massinger has given a strong proof of his genius, by introducing in a different play, a similar character, in a like situation to that of Pisander, yet with sufficient discrimination of manners and incident: I mean Don John, in the *Very Woman*, who, like Pisander, gains his mistress's heart, under the disguise of a slave.\* Don John is a model of magnanimity, superior to Cato, because he is free from pedantry and ostentation. I believe he may be regarded as an original charac-

\* If Massinger formed the singular character of Sir Giles Over-reach from his own imagination, what should we think of his sagacity, who have seen this poetical phantom realized in our days? Its apparent extravagance required this support.

ter. It was easy to interest our feelings for all the characters already described, but no writer, before Massinger, had attempted to make a player the hero of tragedy. This, however, he has executed, with surprizing address, in the Roman Actor. It must be confessed that Paris, the actor, owes much of his dignity to incidents: at the opening of the play, he defends his profession successfully before the senate; this artful introduction raises him in our ideas, above the level of his situation, for the poet has "graced him with all the power of words;" the Empress's passion for him places him in a still more distinguished light, and he meets his death from the hand of the Emperor himself, in a mock-play. It is, perhaps, from a sense of the difficulty of exalting Paris's character, and of the dexterity requisite to fix the attention of the audience on it, that Massinger says, in the dedication of this play, that "he ever held "it the most perfect birth of his Minerva." I know not whether it is owing to design, or to want of art, that Romont, in the Fatal Dowry, interests us as much as Charolois, the hero. If Charolois surrenders his liberty to procure funeral rites for his father, Romont previously provokes the court to imprison him, by speaking with too much animation in the cause of his friend. Romont, though insulted by Charolois, who discredits his report of Beaumellé's infidelity,

lity,

lity, flies to him with all the eagerness of attachment, when Charolois is involved in difficulties by the murder of Novalle and his wife, and revenges his death when he is assassinated by Pontalier. Rowe, who neglected the finest parts of this tragedy in his plagiarism, (the Fair Penitent) has not failed to copy the fault I have pointed out. His Horatio is a much finer character than his Altamont, yet he is but a puppet when compared with Massinger's Romont. Camiola, the Maid of Honour, is a most delightful character; her fidelity, generosity, dignity of manners and elevation of sentiments, are finely displayed, and nobly sustained throughout. It is pity that the poet thought himself obliged to debase all the other characters in the piece, in order to exalt her. There is an admirable portrait of Old Malefort, in that extravagant composition, the Unnatural Combat. The poet seems to equal the art of the writer whom he here imitates;

----- I have known him  
From his first youth, but never yet observ'd  
In all the passages of his life and fortunes,  
Virtues so mix'd with vices. Valiant the world speaks  
him,  
But with that bloody; liberal in his gifts;  
But, to maintain his prodigal expence,  
A fierce extortioner; an impotent lover  
Of women for a flash, but, his fires quench'd,  
Hating as deadly. -----

Almira

Almira and Cardenes, in the *Very Woman*, are copied from nature, and therefore never obsolete. They appear, like many favourite characters in our present comedy, amiable in their tempers, and warm in their attachments, but capricious, and impatient of controul. Massinger, with unusual charity, has introduced a physician in a respectable point of view, in this play. We are agreeably interested in Durazzo\*, who has all the good nature of Terence's Micio, with more spirit. His *Picture of Country Sports* may be viewed with delight even by those who might not relish the reality.

----- Rise before the sun,  
Then make a breakfast of the morning-dew.  
Serv'd up by nature on some grassy hill;  
You'll find it Nectar.

In the *City Madam*, we are presented with the character of a finished hypocrite, but so artfully drawn, that he appears to be rather governed by external circumstances, to which he adapts himself, than to act, like Moliere's *Tartuffe*, from a formal system of wickedness. His humility and benevolence, while he appears as a ruined man, and as his brother's servant, are evidently produced by the pressure of his misfortunes, and he discovers a tameness amidst the insults of his relations that indicates an inherent baseness of

\* The Guardian.

disposition.

disposition\*.—When he is informed that his brother has retired from the world, and has left him his immense fortune, he seems at first to apprehend a deception.

----- O my Lord!

This heap of wealth which you possess me of,  
Which to a worldly man had been a blessing,  
And to the messenger might with justice challenge  
A kind of adoration, is to me  
A curse, I cannot thank you for; and much less  
Rejoice in that tranquillity of mind,  
My brother's vows must purchase. I have made  
A dear exchange with him. He now enjoys  
My peace and poverty, the trouble of  
His wealth conferr'd on me, and *that* a burden  
Too heavy for my weak shoulders. Act III. Sc. 2.

On receiving the will, he begins to promise unbounded lenity to his servants, and makes professions and promises to the Ladies who used him so cruelly in his adversity, which appear at last to be ironical, though they take them to be sincere. He does not display himself till he has visited his wealth, the sight of which dazzles and astonishes him so far as to throw him off his guard, and to render him insolent. Massinger displays a knowledge of man not very usual with dramatic writers, while he represents the same person as prodigal of a small fortune in his youth, servile and hypocritical in his distresses, arbitrary and rapacious, in the possession of wealth sud-

\* See particularly his Soliloquy, Act III. Sc. 2.

denly acquired: for those seeming changes of character depend on the same disposition variously influenced; I mean, on a base and feeble mind, incapable of resisting the power of external circumstances. In order, however, to prepare us for the extravagances of this character, after he is enriched, the poet delineates his excessive transports on viewing his wealth, in a speech which cannot be injured by a comparison with any soliloquy in our language.

'Twas no fantastic object, but a truth,  
 A real truth, no dream. I did not slumber,  
 And could wake ever, with a brooding eye  
 To gaze upon't. It did endure the touch,  
 I saw and felt it. Yet what I beheld  
 And handled oft, did so transcend belief,  
 (My wonder and astonishment pass'd o'er)  
 I faintly could give credit to my senses.  
 Thou dumb magician [the Key] that without a charm  
 Didst make my entrance easy, to possess  
 What wise men wish and toil for; Hermes, Moly,  
 Sybillas' golden bough, the great elixir,  
 Imagin'd only by the alchemist,  
 Compar'd with thee are shadows; thou the substance  
 And guardian of felicity. No marvel  
 My brother made thy place of rest his bosom,  
 Thou being the keeper of his heart, a mistress  
 To be hugg'd ever. In bye corners of  
 This sacred room, silver in bags heap'd up,  
 Like billets saw'd and ready for the fire,  
 Unworthy to hold fellowship with bright gold  
 That flow'd about the room, conceal'd itself.  
 There needs no artificial light, the splendour  
 Makes a perpetual day there, night and darkness

By

By that still-burning lamp for ever banish'd.  
 But when, guided by that, my eyes had made  
 Discovery of the caskets, and they open'd,  
*Each sparkling diamond from itself shot up*  
*A pyramid of flames, and in the roof*  
*Fix'd it a glorious star,* and made the place  
*Heav'n's abstract or epitome,* rubies, sapphires,  
 And ropes of orient pearl; these seen, I could not  
 But look on gold with contempt. And yet I found  
 (What weak credulity could have no faith in)  
 A treasure far exceeding these. Here lay  
 A manor bound fast in a skin of parchment,  
 The wax continuing hard, the acres melting.  
 Here a sure deed of gift for a market town,  
 If not redeem'd this day, which is not in  
 The unthrift's power. There being scarce one shire  
 In Wales or England, where my monies are not  
 Lent out at usury, the certain hook  
 To draw in more. I am sublim'd! gross earth  
 Supports me not. I walk on air! Who's there?  
[seeing strangers]

Thieves! raise the street! Thieves!

It was a great effort by which such a train of violent emotions, and beautiful images was drawn, with the strictest propriety, from the indulgence of a passion to which other poets can only give interest in its anxieties and disappointments. Every sentiment in this fine soliloquy is touched with the hand of a master; the speaker, overcome by the splendour of his acquisitions, can scarcely persuade himself that the event is real; "it is no fantasy, but a truth; a real truth, no dream; he does not slumber;"  
the

the natural language of one who strives to convince himself that he is fortunate beyond all probable expectation; for "he could wake ever to gaze upon his treasure:" again he reverts to his assurances; "it did endure the touch; he saw and felt it." These broken exclamations and anxious repetitions are the pure voice of nature. Recovering from his astonishment, his mind dilates with the value of his possessions, and the poet finely directs the whole gratitude of this mean character to the key of his stores. In the description which follows, there is a striking climax in sordid luxury; that passage where

Each sparkling diamond from itself shot forth  
A pyramid of flames, and in the roof  
Fix'd it a glorious star, and made the place  
Heav'n's abstract or epitome;

though founded on a false idea in natural history, long since exploded, is amply excused by the singular and beautiful image which it presents. The contemplation of his enormous wealth, still amplified by his fancy, transports him at length to a degree of frenzy, and now seeing strangers approach, he cannot conceive them to come upon any design but that of robbing him, and with the appeasing of his ridiculous alarm this storm of passion subsides, which stands unrivalled in its kind, in dramatic history. The soliloquy possesses a very uncommon beauty, that of forcible description, united with passion and character.



rafter. I should scarcely hesitate to prefer the description of Sir John Frugal's Counting-House to Spenser's House of Riches.

It is very remarkable, that in this passage, the versification is so exact (one line only excepted) and the diction so pure and elegant, that, although much more than a century has elapsed since it was written, it would be perhaps impossible to alter the measure or language without injury, and certainly very difficult to produce an equal length of blank verse, from any modern poet, which should bear a comparison with Massinger's, even in the mechanical part of its construction. This observation may be extended to all our poet's productions: majesty, elegance, and sweetness of diction predominate in them. It is needless to quote any single passage for proof of this, because none of those which I am going to introduce, will afford any exception to the remark. Independent of character, the writings of this great poet abound with noble passages. It is only in the productions of true poetical genius that we meet with successful allusions to sublime natural objects; the attempts of an inferior writer, in this kind, are either borrowed or disgusting. If Massinger were to be tried by this rule alone, we must rank him very high; a few instances will prove this. Theophilus, speaking of Dioclesian's arrival, says,

--- The

---- The marches of great Princes,  
Like to the motions of prodigious meteors,  
Are step by step observed. ----

VIRGIN MARTYR, A& I. Sc. 1.

The introductory circumstances of a threatening  
piece of intelligence, are

----- but creeping billows  
Not got to shore yet. -----

1b. A& II. Sc. 2.

In the same play, we meet with this charming  
image, applied to a modest young nobleman ;

The sun beams which the Emperor throws on him,  
Shine there but as in water, and gild him  
Not with one spot of pride.

No other figure could so happily illustrate the  
peace and purity of an ingenuous mind, uncor-  
rupted by favour. Massinger seems fond of this  
thought ; we meet with a similar one in the  
Guardian ;

I have seen those eyes with pleasant glances play  
Upon Adorio's, like Phœbe's shine  
Gilding a crystal river. A& IV. Sc. 1.

There are two parallel passages in Shakespeare,  
to whom we are probably indebted for this, as  
well as for many other fine images of our poet.  
The first is in the Winter's Tale ;

He says he loves my daughter ;  
I think so too ; for never gaz'd the moon  
Upon the water, as he'll stand, and read,  
As 'twere, my daughter's eyes. A& IV. Sc. 4.

The

The second is ludicrous;

KING. Vouchsafe, bright moon, on these thy stars to shine,  
(Those clouds removed) on our wat'ry eyne.

ROS. O vain petitioner, beg a greater matter,  
Thou now requests't but moonshine in the water.  
LOVE'S LABOUR LOST, ACT IV.

The following images are applied, I think, in a new manner;

As the sun  
Thou did'st rise gloriously, kept'st a constant course,  
In all thy journey, and now, in the ev'ning,  
When thou should'st pass with honour to thy rest,  
Wilt thou fall like a meteor?

VIRG. MART. ACT V. SC. 2.

O Summer friendship,  
Whose flatt'ring leaves that shadow'd us in our  
Prosperity, with the least gust drop off  
In th' autumn of adversity.

MAID OF HONOUR, ACT III. SC. 1.

In the last quoted play, Camiola says, in perplexity,

What a sea  
Of melting ice I walk on!

A very noble figure, in the following passage, seems borrowed from Shakespeare:

What a bridge  
Of glass I walk upon, over a river  
Of certain ruin! *mine own weighty fears*  
*Cracking what should support me.*

BONDMAN, ACT IV. SC. 3.

I'll read you matter deep and dangerous,  
As full of peril and advent'rous spirit

As to o'erwalk a current roaring loud,  
On the unsteadfast footing of a spear.

HENRY IV. Part I. Act I. Sc. 3.

It cannot be denied that Massinger has improved on his original: He cannot be said to borrow, so properly as to imitate. This remark may be applied to many other passages: thus, Harpax's menace,

----- I'll take thee—and hang thee  
In a contorted chain of icicles  
I'th' frigid zone, -----

VIRG. MART. Act V. Sc. 1.

is derived from the same source with that passage in Measure for Measure, where it is said to be a punishment in a future state,

----- to reside  
In thrilling regions of thick-ribbed ice.

Again, in the Old Law, we meet with a passage, similar to a much celebrated one of Shakespeare's, but copied with no common hand:

----- In my youth  
I was a soldier, no coward in my age;  
I never turn'd my back upon my foe:  
I have felt nature's winter's sicknesses,  
Yet ever kept a lively sap within me,  
To greet the cheerful spring of health again.

OLD LAW, Act I. Sc. 2.

Though I look old, yet I am strong and lusty,  
For in my youth I never did apply  
Hot and rebellious liquors to my blood;  
Nor did not with unbashful forehead woo  
The means of weakness and debility,

Therefore

Therefore my age is as a lusty winter,  
Frosty but kindly \*. AS YOU LIKE IT, A& II. Sc. 3.

Our poet's writings are stored with fine sentiments, and the same observation which has been made on Shakespeare's, holds true of our author, that his sentiments are so artfully introduced, that they appear to come uncalled, and to force themselves on the mind of the speaker†. In the legendary play of the Virgin Martyr, Angelo delivers a beautiful sentiment, perfectly in the spirit of the piece ;

----- Look on the poor  
With gentle eyes, for in such habits, often,  
Angels desire an alms.

When Francisco, in the Duke of Milan, succeeds in his designs against the life of Marcelia, he remarks with exultation, that

When he's a suitor, that brings cunning arm'd  
With power to be his advocate, the denial  
Is a disease as killing as the plague,  
And chastity a clue that leads to death.

Pisander, in the Bondman, moralizes the in-

\* In an expression of Archidamas, in the Bondman, we discover, perhaps, the origin of an image in Paradise Lost :

----- O'er our heads, with *sail-stretch'd wings*,  
Destruction hovers. ----- A& I. Sc. 3.

Milton says of Satan,

----- *His sail-broad vangs*  
He spreads for flight.

† Mrs. Montagu's Essay on Shakespeare.

solence of the slaves to their late tyrants, after the revolt, in a manner that tends strongly to interest us in his character:

Here they, that never see themselves, but in  
 The glass of servile flatt'ry, might behold  
 The weak foundation upon which they build  
 That trust in human frailty. Happy those,  
 That, knowing in their births, they are subject to  
 Uncertain change, are still prepar'd and arm'd  
 For either fortune: a rare principle!  
 And with much labour learn'd in wisdom's school.  
 For as these Bondmen by their actions shew  
 That their prosperity, like too large a sail,  
 For their small bark of judgment, sinks them with  
 A fore-right gale of liberty, ere they reach  
 The point they long to touch at; so these wretches,  
 Swoln with the false opinion of their worth,  
 And proud of blessings left them, not acquired;  
 That did believe they could with giant-arms  
 Fathom the earth, and were above their fates;  
 Those borrowed helps that did support them vanish'd,  
 Fall of themselves, and by unmanly suff'rings  
 Betray their proper weakness.

BONDMAN Act III. Sc. 3.

His complaint of the hardships of slavery must not be entirely passed over;

----- The noble horse,  
*That in his fiery youth from his wide nostrils*  
*Neigh'd courage to his rider, and broke through*  
*Groves of opposed pikes, bearing his lord*  
*Safe to triumphant victory, old or wounded,*  
*Was set at liberty and freed from service.*  
*Th' Athenian mules that from the quarry drew*  
*Marble, hew'd for the temples of the gods,*

The

The great work ended, were dismiss'd, and fed  
At th' public cost; nay faithful dogs have found  
Their sepulchres; but man to man more cruel,  
Appoints no end to th' sufferings of his slave.

Ib. A & IV. Sc. 2

The sense of degradation in a lofty mind, hurried into vice by a furious and irresistible passion, is expressed very happily in the Renegado, by Donusa.

----- What poor means  
Must I make use of now? And flatter such,  
To whom, till I betray'd my liberty,  
One gracious look of mine would have erected  
An altar to my service.

Again,

----- O that I should blush  
To speak what I so much desire to do!

When Mathias, in the Picture, is informed by the magical skill of his friend, that his wife's honour is in danger, his first exclamations have at least as much sentiment as passion:

----- It is more  
Impossible in Nature for gross bodies  
Descending, of themselves to hang in th' air,  
Or with my single arm to underprop  
A falling tower, nay in its violent course  
To stop the lightning, than to stay a woman  
Hurried by two furies, lust and falsehood,  
In her full career to wickedness -----

----- I am thrown  
From a steep rock, headlong into a gulph

Of misery, and find myself past hope,  
 In the same moment that I apprehend  
 That I am falling. - - - - -

PICTURE, Act IV. Sc. 1.

But if Massinger does not always exhibit the liveliest and most natural expressions of passion; if like most other poets, he sometimes substitutes declamation for those expressions; in description at least he puts forth all his strength, and never disappoints us of an astonishing exertion. We may be content to rest his character, in the description of passion, on the following single instance. In the *Very Woman*, Almira's lover, Cardenes, is dangerously wounded in a quarrel, by Don John Antonio, who pays his addresses to her. Take now, a description of Almira's frenzy on this event, which the prodigal author has put into the mouth of a chambermaid:

- - - - - If she slumber'd, strait,  
 As if some dreadful vision had appear'd,  
 She started up, her hair unbound, and with  
 Distracted looks staring about the chamber,  
 She asks aloud, "Where is Martino? where  
 "Have you conceal'd him?" Sometimes names  
                  Antonio,  
*Trembling in ev'ry joint, her brows contracted;*  
*Her fair face as 'twere chang'd into a curse,*  
*Her hands held up* THUS, and as if her words  
 Were too big to find passage thro' her mouth,  
 She groans, then throws herself upon her bed,  
 Beating her breast. - - - - -

A *VERY WOMAN*, Act II.

To



To praise or to elucidate this passage, would be equally superfluous; I am acquainted with nothing superior to it, in descriptive poetry, and it would be hardy to bring any single instance in competition with it. Our poet is not less happy in his descriptions of inanimate nature, and his descriptions bear the peculiar stamp of true genius in their beautiful conciseness. What an exquisite picture does he present in the compass of less than two lines!

- - - - - Yon' hanging cliff, that glasses  
His rugged forehead in the neighb'ring lake.

RENEGADO.

Thus also Dorothea's description of Paradise;

*There's a perpetual Spring, perpetual youth,  
No joint-benumbing cold, nor scorching heat,  
Famine nor age have any being there.*

VIRG. MART. A& IV.

After all the encomiums on a rural life, and after all the soothing sentiments and beautiful images lavished on it, by poets who never lived in the country, Massinger has furnished one of the most charming unborrowed descriptions that can be produced on the subject:

Happy the golden mean! had I been born  
In a poor fordid cottage, not nurs'd up  
With expectation to command a court,  
I might, like such of your condition, sweetest,  
Have tak'n a safe and middle course, and not,  
As I am now, against my choice compell'd,  
Or to lie grov'ling on the earth, or rais'd

So high upon the pinnacles of state,  
 That I must either keep my height with danger,  
 Or fall with certain ruin. -----  
 ----- We might walk  
 In solitary groves, or in choice gardens;  
 From the variety of curious flowers  
 Contemplate nature's workmanship, and wonders;  
 And then, for change, near to the murmurs of  
 Some bubbling fountain, I might hear you sing,  
 And from the well-tun'd accents of your tongue  
 In my imagination conceive  
 With what melodious harmony a quire  
 Of angels, sing, above, their Maker's praises.  
 And then with chaste discourse, as we return'd,  
 Imp feathers to the broken wings of Time.

----- Walk into  
 The silent groves, and hear the am'rous birds  
 Warbling their wanton notes; here a sure shade  
 Of barren sycamores, which th' all-seeing sun  
 Could not pierce through; near that, an arbour hung  
 With spreading eglantine; there a bubbling spring  
 Wat'ring a bank of hyacinths and lilies.

GREAT DUKE OF FLORENCE.

Let us oppose to these peaceful and inglorious  
 images, the picture of a triumph by the same  
 masterly hand;

----- When she views you,  
 Like a triumphant conqueror, carried through  
 The streets of Syracuse, the glad people  
 Pressing to meet you, and the senators  
 Contending who shall heap most honours on you;  
 The oxen crown'd with garlands led before you  
 Appointed for the sacrifice; and the altars  
 Smoking with thankful incense to the gods.

The

The soldiers chanting loud hymns to your praise;  
 The windows fill'd with matrons, and with virgins  
 Throwing upon your head, as you pass by,  
 The choicest flowers, and silently invoking  
 The Queen of Love, with their particular vows,  
 To be thought worthy of you. BONDMAN.

Every thing here is animated, yet every action is appropriated: a painter might work after this sketch, without requiring an additional circumstance.

The speech of young Charolois, in the Funeral Procession, if too metaphorical for his character and situation, is at least highly poetical:

How like a silent stream shaded with night,  
 And gliding softly with our windy sighs,  
 Moves the whole frame of this solemnity!

-----  
 Whilst I, the only murmur in this grove  
 Of death, thus hollowly break forth. - - -

FATAL DOWRY.

It may afford some consolation to inferior genius, to remark that even Massinger sometimes employs pedantic and over-strained allusions. He was fond of displaying the little military knowledge he possessed, which he introduces, in the following passage, in a most extraordinary manner: one beautiful image in it, must excuse the rest:

----- Were Margaret only fair,  
 The cannon of her more than earthly form,  
 Though mounted high, commanding all beneath it,

And

And ramm'd with bullets of her sparkling eyes,  
Of all the bulwarks that defend your senses  
Could batter none but that which guards your sight.

But -----  
----- when you feel her touch and breath

*Like a soft western wind, when it glides o'er  
Arabia, creating gums and spices,*

And in the van, the nectar of her lips  
Which you must taste, brings the battalia on,  
Well arm'd, and strongly lin'd with her discourse,

-----  
Hippolitus himself would leave Diana,  
To follow such a Venus.

NEW WAY TO PAY OLD DEBTS. AÆ.

What pity, that he should ever write so extravagantly, who could produce this tender and delicate image, in another piece :

What's that? Oh! nothing but the whisp'ring wind,  
Breathes thro' yon churlish hawthorn, that grew rude,  
As if it chid the gentle breath that kiss'd it.

OLD LAW. AÆ.

I wish it could be added to Massinger's just praises, that he had preserved his scenes from the impure dialogue which disgusts us in most of our old writers. But we may observe, in defence of his failure, that several causes operated at that time to produce such a dialogue, and that an author who subsisted by writing was absolutely subjected to the influence of those causes. The manners of the age permitted great freedoms in language; the theatre was not frequented by the best company; the male part of the audience was  
by

by much the more numerous; and, what perhaps had a greater effect than any of these, the women's parts were performed by boys. So powerful was the effect of those circumstances, that Cartwright is the only dramatist of that age whose works are tolerably free from indecency. Massinger's error, perhaps, appears more strongly, because his indelicacy has not always the apology of wit; for, either from a natural deficiency in that quality, or from the peculiar model on which he had formed himself, his comic characters are less witty than those of his cotemporaries, and when he attempts wit, he frequently degenerates into buffoonery. But he has shewed in a remarkable manner the justness of his taste, in declining the practice of quibbling; and as wit and a quibble were supposed, in that age, to be inseparable, we are perhaps to seek, in his aversion to the prevailing folly, the true cause of his sparing employment of wit.

Our poet excells more in the description than in the expression of passion; this may be ascribed in some measure to his nice attention to the fable: while his scenes are managed with consummate skill, the lighter shades of character and sentiment are lost in the tendency of each part to the catastrophe.

The prevailing beauties of his productions are dignity and elegance; their predominant fault is want of passion.

The

The melody, force, and variety of his versification are every where remarkable: admitting the force of all the objections which are made to the employment of blank verse in comedy, Massinger's possesses charms sufficient to dissipate them all. It is indeed equally different from that which modern authors are pleased to stile blank verse, and from the flippant prose so loudly celebrated in the comedies of the day. The neglect of our old comedies seems to arise from other causes, than from the employment of blank verse in their dialogue; for, in general, its construction is so natural, that in the mouth of a good actor it runs into elegant prose. The frequent delineations of perishable manners in our old comedy, have occasioned this neglect, and we may foresee the fate of our present fashionable pieces, in that which has attended Johnson's, Fletcher's, and Massinger's: they are either entirely overlooked, or so mutilated, to fit them for representation, as neither to retain the dignity of the old comedy, nor to acquire the graces of the new.

The changes of manners have necessarily produced very remarkable effects, on theatrical performances. In proportion as our best writers are farther removed from the present times, they exhibit bolder and more diversified characters, because the prevailing manners admitted a fuller display of sentiments, in the common intercourse  
of

of life. Our own times, in which the intention of polite education is to produce a general, uniform manner, afford little diversity of character for the stage. Our dramatists, therefore, mark the distinctions of their characters, by incidents more than by sentiments, and abound more in striking situations than interesting dialogue. In the old comedy, the catastrophe is occasioned, in general, by a change in the mind of some principal character, artfully prepared, and cautiously conducted; in the modern, the unfolding of the plot is effected by the overturning of a screen, the opening of a door, or by some other equally dignified machine.

When we compare Massinger with the other dramatic writers of his age, we cannot long hesitate where to place him. More natural in his characters, and more poetical in his diction, than Johnson or Cartwright, more elevated and nervous than Fletcher, the only writers who can be supposed to contest his pre-eminence, Massinger ranks immediately under Shakespeare himself\*.

It must be confessed, that in comedy Massinger falls considerably beneath Shakespeare; his wit is less brilliant, and his ridicule less delicate

\* I omit Milton, because his Samson is an exotic, not captivating to the eyes of Englishmen; and whatever detached beauties Comus may possess, it is incomparably heavy, considered as a dramatic piece.

and various; but he affords a specimen of elegant comedy\*, of which there is no archetype in his great predecessor. By the rules of a very judicious critic†, the characters in this piece appear to be of too elevated a rank for comedy; yet though the plot is somewhat embarrassed by this circumstance, the diversity, spirit, and consistency of the characters render it a most interesting play. In tragedy, Massinger is rather eloquent than pathetic; yet he is often as majestic, and generally more elegant than his master; he is as powerful a ruler of the understanding, as Shakespeare is of the passions: with the disadvantage of succeeding that matchless poet, there is still much original beauty in his works; and the most extensive acquaintance with poetry will hardly diminish the pleasure of a reader and admirer of Massinger.

\* The Great Duke of Florence.

† See the Essay on the Provinces of the Drama.



OBSERVATIONS *on the* BILLS of MORTALITY *for*  
*the Towns of* MANCHESTER and SALFORD; *by*  
THOMAS HENRY, F. R. S. *Acad. Philos. Amer.;*  
*Philadel.; Med. Lond. & Physic. Edinb. Soc.*

READ JANUARY 18, 1786.

IN the year 1773, several persons, many of whom are now Members of this Society, subscribed, for the purpose of obtaining an accurate account of the state of the population of the towns of Manchester and Salford\*, which should contain the number of houses, families, males, females, &c. The result of this inquiry, which was instituted with a view to the opinion, at that time propagated, of the general decline of population in the kingdom, proved that, instead of being diminished, as was supposed to be the case with the inhabitants of London, the number of persons, residing in Manchester and Salford, was greatly increased: that the

\* Manchester and Salford, though distinct townships, are only separated by the river Irwell, and communicate by means of several bridges. In the year 1757 the number of inhabitants was no more than 19839.

number

number of tenanted houses was 4268 ; of families 6416, and of inhabitants 27246 ; or  $6\frac{1}{2}$  to a house. But, in this account, the number of inhabitants residing in the townships, almost the whole of which was then nearly contiguous with the towns, and now forms a part of them, was not included. These districts contained, at that time, 311 houses, 361 families, and 1905 individuals. This number, added to the former, makes that of the inhabitants amount to 29151\*.

Soon after the period, at which this survey was taken, a very considerable increase of inhabitants took place. The spirit and ingenuity of our manufactures made extraordinary and rapid improvements in our fabrics ; and the introduction of machinery, instead of lessening the number of hands, found employment for many additional people. The town extended on every side, and such was the influx of inhabitants, that though a great number of new houses were built, they were occupied even before they were finished.

The progress of the trade and population, though certainly checked, was not wholly restrained, by the unfortunate, and ever to be lamented, war, which was waged, during a period of almost nine years, with our American Colonies, supported by the immense and united

\* Dr. Percival's Essays, vol. III.

forces of France, Spain and Holland. Contrary to every reasonable expectation the manufactures of Manchester were not affected by the war, to any great and alarming degree; and they still found their way, by various channels, to almost every market, where they had been usually sold. By casting our eyes on the bills of mortality, for those years, we find the population of the towns greatly advancing, and, what is a pleasing circumstance, especially considering the number of men, of which they were drained, for the supply of his Majesty's fleets and armies, we see a striking superiority of the births over the burials.

On the happy event of the restoration of peace, the influx of inhabitants was surprizingly great. Multitudes of men, who had served abroad, or in our provincial regiments at home, now returned into the country; and the success of the opposition which was made to the monopoly of the cotton machines, drew, from various quarters, large recruits of people. During the three last years the number of our christenings has been much augmented, but though they still maintain a majority, yet I am sorry to observe, that the list of burials, when compared with those of the three preceding years, is more than proportionably enlarged. A contagious fever has proved very destructive, and its virulence has been, probably, increased, by the crowded and

uncleanly manner, in which the poorer people have been lodged, owing to the want of houses to accommodate them: for, though many have been erected, yet several causes have contributed to restrain the spirit of building. During the war, the high price of timber was a considerable obstacle; and, since the peace, the frosts, which were, for two years together, very intense, and continued till the spring was far advanced, have prevented the making of bricks, and, together with the tax, greatly enhanced their price. From these causes, I believe, were an actual survey taken at present, the number of inhabitants, to a house, would far exceed the amount in the year 1773\*. But it is proper to observe that the devastations of this disease have not been confined to this place. Dr. Fothergill of Bath informs me that all the manufacturing towns, in the vicinity of that city, have been afflicted by a fever of a similar kind. Under so heavy a visitation, it is a pleasing consideration, that, in all probability, the havock, it might have made, has been lessened by the well-timed and charitable assistance that has been afforded, by the trustees of our infirmary, to many unhappy objects, labouring under this dire disease, at their own homes;

\* I have too frequently had opportunities of seeing a man with his wife and three or four children, all residing in one small room, in which they dress their victuals, eat, work, and sleep.

and

and by the humane and skilful treatment of the worthy physicians who have attended them\*.

That the progressive increase of the number of inhabitants of Manchester and Salford may be the better apparent, I have divided a period of twenty-one years into seven smaller periods of three years each, and have given the annual number of registered christenings, marriages and burials, during each of these. And, from these premises, I shall afterwards endeavour to form some calculation of the present number of our inhabitants, compared with that of the year 1773.

### T A B L E I.

Shewing the AVERAGE, ANNUAL NUMBER OF REGISTERED CHRISTENINGS, MARRIAGES, and BURIALS, for Periods of three Years each, from 1765 to 1785, inclusive—Fractions omitted.

#### C H R I S T E N I N G S.

1765, 1766, 1767.	-	-	900
1768, 1769, 1770	-	-	1002

\* About this time a very useful extension of the charity, afforded by this excellent institution, was agreed to by the trustees. All diseases of an infectious nature being wisely excluded from admission into the infirmary, many unhappy objects were necessarily excluded from the benefit of the assistance, afforded in other cases. The physicians, therefore, humanely offered to visit them at their own houses, provided the trustees would allow them to be furnished with medicines from the hospital. The benevolent proposal was accepted, to the great comfort of the poor.

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1771, 1772, 1773	-	-	1098
1774, 1775, 1776	-	-	1237
1777, 1778, 1779	-	-	1475
1780, 1781, 1782	-	-	1611
1783, 1784, 1785	-	-	1838

M A R R I A G E S .

1765, 1766, 1767	-	-	367
1768, 1769, 1770	-	-	415
1771, 1772, 1773	-	-	411
1774, 1775, 1776	-	-	463
1777, 1778, 1779	-	-	503
1780, 1781, 1782	-	-	508
1783, 1784, 1785	-	-	807

B U R I A L S .

1765, 1766, 1767	-	-	811
1768, 1769, 1770	-	-	881
1771, 1772, 1773	-	-	835
1774, 1775, 1776	-	-	1004
1777, 1778, 1779	-	-	1042
1780, 1781, 1782	-	-	1115
1783, 1784, 1785	-	-	1468

TABLE

T A B L E II.

Containing a CALCULATION of the Number of the present INHABITANTS of MANCHESTER and SALFORD, from a Comparison of the BILLS of MORTALITY for the three last Years, with those of the Years preceding the actual Enumeration in 1773.

IN 1773 the total number of the inhabitants of Manchester and Salford, including the Townships, was - 29151

The average number of burials, dissenters included, for five preceding years, was 958

The proportion of deaths to the inhabitants was therefore as one to - - 30.5

The average number of christenings, for the above years, was - - - 1098

And the proportion of these to the inhabitants as one to - - - 26.4

But Dr. Percival, not having included the inhabitants of the township, makes the deaths as one to - - - 28.4

And the christenings as one to - - 25

The average number of burials, dissenters included, for the years 1783-4-and-5 is 1518 $\frac{1}{2}$

M 3

Which

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Which multiplied by 28.4 makes the  
 number of inhabitants                      -                      -      43120  
 And by 30.5                      -                      -                      -      46309  
 The average number of christenings during  
 the above three years, allowing 150  
 for dissenters, of all denominations is 1988 $\frac{1}{2}$   
 Which multiplied by 25 makes                      -                      49708  
 But by 26.5                      -                      -                      -                      52334  
 Average between 43120 $\frac{3}{4}$ , the number  
 obtained by multiplying the burials by  
 28.4 and 49708 $\frac{1}{2}$ , number obtained by  
 multiplying the christenings by 25, is 46414  
 And between 46309 $\frac{1}{4}$ , number obtained  
 by multiplying the burials by 30.5,  
 and 52334, by multiplying the christenings by 26.5                      -                      -                      -      49326  
 The greatest number of burials in any one  
 year, from 1766 to 1773, inclusive, was 1019  
 Ditto from 1778 to 1785 inclusive                      -                      1734  
 The latter exceeding the former by 0.7—  
 20405 or 0.7 of 29151, the number  
 of inhabitants in 1773, added to that  
 number, gives                      -                      -                      -                      49556  
 The greatest number of christenings du-  
 ring any one year of the former period,  
 was                      -                      -                      -                      -                      1168  
 During the latter period                      -                      -                      1958  
 The latter, exceeding the former number,  
 by 0.67, therefore 19530 or 0.67 of

the



the inhabitants in 1773, added to  
29151, gives - - - - 48681

From all these different views, we may, I think, be authorized to conclude that the number of inhabitants of the two towns, cannot be much lower than fifty thousand; especially as from a circumstance, of which I shall hereafter take notice, it is probable that the annual number of deaths is under-rated.

Dr. Percival, whose attention was, some years since, particularly directed to the subject of this paper, pointed out a plan of keeping the Parish Register, which, if it had been pursued, would have been productive of great advantages; and he took pains to ascertain the proportion of deaths by the small-pox, to those by all other diseases\*. In the course of this inquiry he found that, in a space of six years, from 1769, to 1774, inclusive, the deaths, by the small-pox, were nearly one sixth and a half of the whole†. I am happy to observe that, in the last six years, the fatality of this terrible disease has abated; for the deaths by the small-pox,

\* Dr. Percival's Essays, vol. III.

† During the years 1772-3-and-4 the deaths by the small-pox, in Liverpool, amounted, according to an account, communicated by the late Dr. Dobson to Dr. Haygarth, to one in  $5\frac{1}{2}$  of the whole.

from 1780 to 1785, inclusive, only amount to one seventh and a half of the whole number of burials, registered at the collegiate church.

Perhaps there is no disease the medical treatment of which has been more improved than that of the small-pox; and, the improvements, suiting the dispositions and convenience of the lower class of people, have been more frequently adopted than might otherwise have been expected. But prejudices are not to be overcome at once. Time and experience will, I am convinced, carry conviction to the breasts of most men; and the practice of the cool regimen, under proper limitations, the more general practice of inoculation, and the observance of such regulations, as have been publicly recommended by our truly humane and learned associate, Dr. Haygarth, will, in all probability, tend effectually to the farther diminution, if not to the total extinction of the ravages of this loathsome, and, too frequently fatal malady.

Within these few years also the great alterations that have been made in the town, by widening, and providing for the ventilation of the streets, together with the commodiousness of our modern houses, &c. may have contributed to restrain the increased mortality which might otherwise have been apprehended from its enlargement\*: for great towns, it must be allowed, are unfavourable to the duration of human life.

\* Vide Percival's Essays, vol. III.

To find numerous instances of longevity we must leave the widely extended commercial city, where attention to the gain of riches occupies the earlier attention of the superior class of inhabitants, and too frequently, indolence and luxury that of their latter days. Where plenty of employment, though it furnish abundance of the comforts and conveniences of life, to the labouring part of the people, and thereby is preventive of many diseases, yet supplies also the means of intemperance, which though slowly, yet certainly, induces sickness. Accordingly we find that, as our town has increased, the proportion of deaths, at ages above seventy has decreased. During two periods of five years each the number of deaths of persons, above that age, will appear from the following table.

### T A B L E    I I I.

Containing the different Number of DEATHS, of  
PERSONS above the Age of Seventy, in two  
PERIODS of five Years each.

From 1776 to 1780, inclusive.

From 70 to 80 - - 212

80 to 90 - - 101

90 to 100 - - 16

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329

From 1781 to 1785, inclusive.

From 70 to 80 - - 226

80 to 90 - - 114

90 to 100 - - 19

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359

The

The number in the former period is as 1.7 to 9.3; whereas that in the latter is only as 1.5 to 11.5, of the whole number of registered funerals.

But injurious as large towns may be to the duration of life, and though it must be granted that by annually draining the country of a number of inhabitants, they consume many lives, which, in their original situation, might have continued to exist for several years longer, but are cut off by diseases produced by vitiated air, by infection, or by a change in their modes of living, yet on the whole, they are not, perhaps, so unfavourable to population as they may, at first sight, appear. For in large towns, at least in those where extensive manufactures are carried on, the encouragements to matrimony are considerable; and, therefore, if life be more speedily wasted, it is, probably, produced in a far greater ratio\*. A sensible, industrious manufacturer considers his children as his treasure, and boasts that his quiver is full of them; for where children can be employed at an early age, the fear of a large family is not only diminished, but

\* That this is actually the case in Manchester and Salford appears from the registers, although during a period of twenty-one years the marriages and births have been *more* than doubled, yet the increase of burials is only as 29 to 16.

every child that is born may be regarded as an addition of fortune.

A large and populous town, also, is favourable to population, by extending its influence, to a very considerable distance, beyond its own districts. Manchester supplies employment to many thousand people, resident within the country, to the extent of several miles, who gain a comfortable livelihood, in different branches of the manufactory, without suffering the inconveniences which attend the town. The demand of this great body of people, who raise but a very small part of the provisions they consume, added to that of the town, has an effect upon a still larger tract of country, the inhabitants of which are occupied in agriculture; and, being sure of finding a ready and advantageous mart for their products, they are encouraged to a better tillage of their lands, already in cultivation, and to the improvement of waste lands; and that cultivation and competency will increase population by removing the obstacles to matrimony, is an axiom, the truth of which cannot be disputed.

That the increase of the adjacent country keeps pace with that of the town, appears from the state of population in the neighbouring parish of Eccles, where the bills of mortality are kept with an exemplary degree of accuracy. The clerk, at the same time that he distributes,  
through

through the parish, the bill for the preceding year, makes an actual enumeration of the families, houses, and individuals. In the year 1776 the number of inhabitants was 7936, and, in the year 1785, 10522, so that in nine years there has been an addition of 2586 people. And, if we may trust the observation of our senses the increase has been, at least, equal, in most of the parishes to which the manufactory extends.

I find an article in the bill of mortality, for the parish of Eccles, in the year 1784, ascertaining the number of ex-parishioners, buried there, in that year, which amounts to ninety-five. From the situation of the church, as distant from every other parish but that of Manchester, I am convinced that, by far the greatest proportion of them come from hence. And as I have also no doubt, but there are greater numbers carried out to the different chapels of ease and neighbouring parishes than are brought in from other townships and parishes, I believe I may venture to assert that, the number of deaths, in Manchester and Salford, are greater than they appear to be from our own parish register. The burial grounds within the towns, are either so crowded, or so expensive, as to deter many persons from depositing their deceased relations in them. Yet, even making every allowance of this kind, the great superiority of the births over the burials cannot be disputed. During the last  
fix

six years, though the latter have been unusually numerous, the registered births have exceeded the registered burials, by an average of 433, annually\*.

\* Since this paper was read, the bills of mortality, for the years 1786 and 1787, have been published. In the former year, the registered births amounted to 2219, and the burials to 1282; superiority of births 937. In the latter, the births were 2256, and the burials 1761—superiority, 495. And as none of the dissenters are baptized, though many are buried, at the churches, the proportions of births to burials is still greater than is stated. Taking the year 1785 into the account so as to form a period of three years; the average annual number of births, during that period, will be 2139, and that of the deaths, 1592. The former multiplied by 26.5 produces 56683, and the latter, by 30.5 produces 48556; the average of these numbers will be 52619, and if we allow fifty unregistered funerals and 150 births for the dissenters, and multiply and average these as above, we shall have 2745, which added to 52619, will produce 55364, and may be received as nearly the number of inhabitants in Manchester and Salford at the beginning of the present year.

AUGUST 25, 1788.

CONJECTURES

CONJECTURES *relative to the CAUSE of the INCREASE of WEIGHT acquired by some HEATED BODIES, during cooling; by THOMAS HENRY, junior. Communicated by THOMAS HENRY, F. R. S. &c.*

READ MARCH 28, 1786.

MANY experiments have been made by different persons, with a view to determine, whether the addition of actual heat to bodies does increase their weight. M. Buffon has asserted, that a ball of iron, weighing, when cold, 49lb. 11 oz. increased in weight, when made of a white heat, in the proportion of  $19\frac{1}{2}$  grains to every pound. But, it is very probable, that, in this experiment, there was some fallacy, since we find it directly contradictory to the results both of the experiments made by Dr. Roebuck\*, and of those made by Mr. Whitehurst†. The first of these two Gentlemen found, that a cylinder of wrought iron, heated to a welding heat, at which time it weighed, in a very accurate balance, fifty-five pounds,

\* Phil. Transf. vol. LXVI.

† lb.

gradually



gradually acquired, as it cooled, an increase of weight, so that, at the end of twenty-two hours, it weighed six penny weights, seventeen grains more, than it did when first committed to the balance. This phænomenon, which, by some has been adduced to prove, that heat is the principle of levity in bodies, Mr. Whitehurst has endeavoured to explain, by supposing, that the air, above the scale being rarefied by the heated iron, the cold air below rushed up, and, striking against the bottom of the scale, not only prevented its descent, but even buoyed it up. Something may perhaps be attributed to this cause. But would not the circumambient air beneath the scale be nearly as much rarefied as that above? And is it not probable, that the supposed force of this current of air, would be, in great measure, counteracted by the greater tendency a body has to descend in a rarefied, than in a dense medium? Is it not probable, likewise, that the end of the beam, to which the heated iron was appended, would by the same heat which rarefied the air, be more expanded, and lengthened, owing to its nearer approximation to the source from which the heat flowed, than the more distant end of the beam? I would likewise observe, that in the experiment of M. Buffon above quoted, and in one made by Dr. Roebuck on a smaller scale, the mass, owing perhaps to the  
joint

joint action of the above causes, weighed more when hot, than when cold.

Having thus endeavoured to shew, the insufficiency of the explanation given by Mr. Whitehurst, I will venture, with the greatest diffidence, to propose the following query. May not the increase of weight, acquired by heated iron, and copper, during cooling, be ascribed to the calcination, and consequent absorption of air, continuing to proceed after the removal of the mass of metal from the fire, the absorption of air in particular, in the first stages of the cooling, perhaps, with increased rapidity? In support of this conjecture, the following facts may be adduced. First; That some metals, particularly copper\*, are found to calcine more rapidly, in a moderate degree of heat, than in one more intense. Secondly; That, the calces of some metals, as that of lead, have been observed to increase in weight by long exposure to the air, and that they now afford by proper treatment, more air, than could have been obtained from them, previous to such exposure. Thirdly; We shall find by examining Dr. Roebuck's account of his experiments, that the weight continued to increase long after the cause assigned by Mr. Whitehurst must have ceased to act. The cylinder, which was repeatedly

\* Macquer's Inst. of Chemistry, vol. I.

weighed

weighed at intervals, when it had been in the scale six hours, and had then lost so much of its heat, as to be only blood warm, was found to be acquiring weight in the proportion of seven grains in the space of an hour\*. But, when weighed the day following, at the expiration of twenty-four hours after the commencement of the experiment, it had acquired a still further addition of two pennyweights and seventeen grains, which, according to the above progression, it would have required at least nine hours and a half, nay, most probably, even a longer time, to accomplish. If to these nine hours and a half, we add the preceding six, we obtain fifteen hours and a half; a period long before the expiration of which, the mass of iron must have taken the temperature of the surrounding bodies, since the first six of these were sufficient to reduce it, from the welding point, down to blood heat.

I will not trespass longer on the time of the Society, ,but will conclude by observing, that metals, which are the only bodies hitherto employed to determine this point, are certainly, from the changes they undergo by the action

\* During the two first hours of its exposure in the scale, the increase of weight had proceeded with much more rapidity; in the third hour it proceeded less quickly, and continued to diminish gradually in celerity to the expiration of the sixth.

of heat, very ill adapted to the purpose; and that to arrive at any degree of certainty, it will perhaps be necessary to weigh the body in vacuo, or at least in a vessel so confined, as that any current of air through it shall be prevented; and that the beam of the scales shall be formed of materials less liable to expansion by heat, than metals in general are.

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REMARKS *on the FLOATING of CORK BALLS in WATER*; by Mr. BANKS, *Lecturer in Natural Philosophy. Communicated by the Rev. THOMAS BARNES, D. D. Fellow of the American Philosophical Society, bolden at Philadelphia.*

READ DECEMBER 6, 1786.

**P**ERHAPS no simple appearance seems so generally misunderstood as that of Cork Balls, &c. on Water; and as one false principle, adopted, is often productive of more, a few observations on so simple a phenomenon, perhaps, may not be thought below the notice of the learned, although perfectly acquainted with the true cause. That clean bubbles of glass or pieces of cork, left to swim in water, contained in clean vessels of glass or china, and at the distance

distance of about one inch from the side, will approach that side is certain; and it appears that this and similar experiments have frequently been made by philosophers, to prove the attraction of these bodies. To this I cannot assent, for different reasons; which I presume are supported by the following experiments.

The experiments are made in a vessel of glass or earthen ware five or six inches in diameter.

EXPERIMENT I. If a clean cork be wet and placed about one inch from the side of the containing vessel, it will approach the side with an accelerated motion.

EXPERIMENT II. If two corks be placed about an inch from each other, and at a sufficient distance from the side, they approach each other in the same manner.

EXPERIMENT III. Pour water into the vessel till it is rather higher than the brim; place the cork close by the side, and it recedes with a retarded motion.

EXPERIMENT IV. Sink a piece of metal in the center of the vessel, so that the top thereof may be above the surface of the water, the cork, placed at a proper distance, will approach it.

EXPERIMENT V. Raise the water until the metal is covered, and the cork will remain at rest at any distance from the metal.

In all the experiments, the water which surrounds the balls is elevated by capillary attraction, as also by the side of the containing vessel, except in experiment III.

EXPERIMENT VI. Pieces of dry cork, or painted balls, placed gently on water, and near each other, also approach each other; but if one is placed near the side of the containing vessel, adjoining to which the water is elevated, it will recede.

In this experiment the surrounding fluid is depressed.

Whether these bodies attract each other, or not, I presume is not to be determined by these experiments; however they are not intended to disprove any attraction, but rather to prove that there is some other more powerful cause on which the phenomena depend: if not, why does the ball in the third experiment leave the side, to which it adhered in the first; or how shall we account for the universal recess of balls around which the fluid is depressed, from those around which it is elevated; and why are they not attracted by bodies exceedingly near, when these bodies are perfectly covered with water?

These experiments I know are not of sufficient weight with some who rank high amongst the literati, to prove that the phenomena are not owing to attraction; yet I presume the true cause has long since been explained upon hydrostatical

statical principles by Dr. W. J. Gravesande, &c. for, as every body which swims impresses the supporting fluid with a force equal to its own weight, the fluid reacts and presses the supported body with the same force. The sides of the body are also pressed by the surrounding fluid with forces which are as the depth: and if the encompassing water be raised by capillary attraction, the pressure will still be the same, or equal on opposite sides, so that without force the body cannot move; but if it be placed so near the side that the water elevated by it joins that elevated by the side of the vessel, or by another ball, the pressure on that side is diminished, while that on the other side, remaining the same, will cause it to approach the side or other ball: and in the same manner, if the fluid is depressed, when the cavities meet, the pressure on that side will be diminished, and the bodies of consequence approach each other or the side of the vessel; and the recess in the third experiment is evidently owing to the pressure being superior on that side nearest to the glass, when the fluid is elevated above it, and the elevation round the ball joins the declining surface near the edge. Some indeed have drawn directly the contrary conclusion; but when the elevated water which surrounds the ball, and is supported by it, is caused with one side to join the declining surface of the supporting fluid, it must then gra-

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vitae and press in all directions with more force as there is more of it elevated above the surface of the supporting water.

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CASE of a PERSON *becoming* SHORT-SIGHTED in  
ADVANCED AGE; by THOMAS HENRY, F. R. S.  
&c.

READ NOVEMBER 29, 1786.

**I** REMEMBER it was, some years since, mentioned in this Society, that a method had been recommended, but where or by whom I do not recollect, of preventing the necessity of using spectacles, in advanced age. It consisted in the practice of reading a very small print by the light of a small candle. By this means, the humours of the eye being protruded, the crystalline lens was supposed to be hindered from losing its convex form, and assuming that flatness, which it acquires in old persons.

I lately met with a Gentleman, who, contrary to what generally happens to men as they advance in life, was, at the age of fifty, become short-sighted; whereas, when younger, his eyes had not that fault; and who instead of being obliged to use convex glasses, had found it necessary



necessary to employ concave ones, and to procure them still more so, the older he grew. This change in his sight, he informed me, he first observed, after having for some time, accustomed himself to read a book, printed in a small character, and, *that*, frequently in the close of the evening, when the light was not favourable for the purpose.

As this is an uncommon fact, and may serve to confirm the propriety of the doctrine; I have alluded to, I thought it might be proper to communicate it to the Society.

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*An Account of the PROGRESS of POPULATION, AGRICULTURE, MANNERS, and GOVERNMENT in PENNSYLVANIA. In a Letter from BENJAMIN RUSH, M. D. and Professor of Chemistry in the University of PENNSYLVANIA, to THOMAS PERCIVAL, M. D. F. R. S. &c. &c..*

READ DECEMBER 6, 1786.

S I R,

**W**HATEVER tends to unfold facts in the history of the human species must be interesting to a curious inquirer. The manner of settling a new country exhibits a view of the human mind so foreign to the views of it which

have been taken for many centuries in Europe, that I flatter myself the following account of the progress of Population, Agriculture, Manners, and Government in Pennsylvania will be acceptable to you. I have chosen to confine myself, in the present letter, to Pennsylvania only, that all the information I shall give you may be derived from my own knowledge and observations.

The *first* settler in the woods, is generally a man who has outlived his credit or fortune in the cultivated parts of the state. His time for migrating is in the month of April. His first object is to build a small cabin of rough logs, for himself and family. The floor of this cabin is of earth, the roof of split logs, the light is received through the door, and in some instances, through a small window made of greased paper. A coarser building, adjoining this cabin, affords a shelter to a cow and a pair of poor horses. The labour of erecting these buildings is succeeded by killing the trees on a few acres of ground near his cabin. This is done by cutting a circle round the trees, two or three feet from the ground. The ground around these trees is then ploughed, and Indian corn planted in it. The season for planting this grain is about the twentieth of May. It grows generally, on new ground, with but little cultivation, and yields in the month of October following, from forty to fifty bushels an acre. After the first of September, it affords a  
good

good deal of nourishment to his family in its green or unripe state, in the form of what is called *roasting ears*. His family is fed, during the summer, by a small quantity of grain, which he carries with him, and by fish and game. His cows and horses feed upon wild grass, or the succulent twigs of the woods. For the first year, he endures a great deal of distress from hunger, cold, and a variety of accidental causes; but he seldom complains or sinks under them. As he lives in the neighbourhood of Indians, he soon acquires a strong tincture of their manners. His exertions, while they continue, are violent, but they are succeeded by long intervals of rest. His pleasures consist chiefly in fishing and hunting. He loves spirituous liquors, and he eats, drinks, and sleeps in dirt and rags, in his little cabin.

In his intercourse with the world, he manifests all the arts which characterize the Indians of our country. In this situation he passes two or three years. In proportion as population increases around him, he becomes uneasy and dissatisfied. Formerly, his cattle ranged at large, but now his neighbours call upon him to confine them within fences, to prevent their trespassing upon their fields of grain. Formerly, he fed his family upon wild animals, but these, which fly from the face of man, now cease to afford him an easy subsistence, and he is compelled to raise domestic animals for the support of his family. He cannot

not bear to surrender up a single natural right for all the benefits of government, and therefore he abandons his little settlement, and seeks a retreat in the woods, where he again submits to all the toils which have been mentioned. There are instances of many men who have broken ground, on bare creation, not less than four different times in this way, in different and more advanced parts of the state. It has been remarked, that the flight of this class of people is always increased by the preaching of the gospel. This will not surprize us when we consider how opposite its precepts are to their licentious manner of living. If our first settler were the owner of the spot of land which he began to cultivate, he sells it at a considerable profit to his successor; but if (as is oftener the case) he were a tenant to some rich land-holder, he abandons it in debt; but the small improvements he leaves behind him generally make it an object of immediate demand to a *second* species of settler.

This species of settler is generally a man of some property. He pays one third, or one fourth part in cash for his plantation, which consists of three or four hundred acres, and the rest in sales or instalments, as it is called here; that is, a certain sum yearly, without interest, till the whole is paid. The first object of this settler is to build an addition to his cabin. This is done with hewn logs, and, as saw mills generally follow

low settlements, his floors are made of boards; his roof is made of what are called clab-boards, which are a kind of coarse shingles split out of short logs. This house is divided by two floors, on each of which are two rooms. Under the whole is a cellar walled with stone. The cabin serves as a kitchen to this house. His next object is to clear a little meadow ground, and plant an orchard of two or three hundred apple trees. His stable is likewise enlarged, and, in the course of a year or two, he builds a large log-barn, the roof of which is commonly thatched with rye straw. He, moreover, increases the quantity of his arable land, and instead of cultivating Indian corn alone, he raises a quantity of wheat and rye. The latter is cultivated chiefly for the purpose of being distilled into whisky. This species of settler by no means extracts all from the earth which it is able and willing to give. His fields yield but a scanty increase, owing to the ground not being sufficiently ploughed. The hopes of the year are often blasted by his cattle breaking through his half-made fences, and destroying his grain. His horses perform but half the labour that might be expected from them, if they were better fed; and his cattle often die in the spring from the want of provision, and the delay of grass. His house, as well as his farm, bears many marks of a weak tone of mind. His windows are unglazed, or if they have had glass in them, the ruins

ruins of it are supplied with old hats, or pillows. This species of settler is seldom a good member of civil or religious society; with a large portion of an hereditary, mechanical kind of religion, he neglects to contribute any thing towards building a church, or maintaining a regular administration of the ordinances of the gospel. He is equally indisposed to support civil government. With high ideas of liberty, he refuses to bear his proportion of the debt contracted by its establishment in our country. He delights chiefly in company, sometimes drinks spirituous liquors to excess, will spend a day or two in hunting up a newspaper that contains a political publication, and thus he contracts debts which (if he cannot discharge in a depreciated paper currency) compel him to sell his plantation, generally in the course of a few years, to the *third* and last species of settler.

This species of settler is commonly a man of property and good character. Sometimes he is the son of a wealthy farmer in one of the interior and ancient counties of the state. His first object is to convert every spot of ground, over which he is able to draw water, into meadow. Where this cannot be done, he selects the most fertile spots on the farm, and devotes them by manure to that purpose. His next object is to build a barn, which he prefers of stone. This building is, in some instances, a hundred feet in front,

front, and forty in depth. It is made very compact so as to shut out the cold in winter, for our farmers find that their horses and cattle when kept warm, do not require near as much food, as when they are exposed to the cold. He uses œconomy likewise in the consumption of his wood. Hence, he keeps himself warm in winter by means of stoves, which save an immense deal of labour to himself and his horses, in cutting and hauling wood in cold and wet weather. His fences are every where repaired so as to secure his grain from his own and his neighbour's cattle. But further; he increases the number of the articles of his cultivation; and instead of raising corn, wheat and rye alone, he raises oats, buck-wheat (the phagopyrum of Linnæus) and spelts. Near his house, he allots an acre or two of ground for a garden, in which he raises a large quantity of cabbage and potatoes. His newly cleared fields afford him every year a large increase of turnips. Over the spring which supplies him with water, he builds a milk-house. He likewise adds to the number, and improves the quality of his fruit trees; his sons work by his side all the year, and his wife and daughters forsake the dairy and the spinning-wheel, to share with him in the toils of harvest. The last object of his industry is to build a dwelling-house. This business is sometimes effected in the course of his life, but is oftener bequeathed

bequeathed to his son, or the inheritor of his plantation; and hence we have a common saying among our best farmers, "that a son should always begin where his father left off;" that is, he should begin his improvements by building a commodious dwelling-house, suited to the improvements and value of the plantation. This dwelling-house is generally built of stone; it is large and convenient, and filled with useful and substantial furniture. It sometimes adjoins the house of the second settler; but it is frequently placed at a little distance from it. The horses and cattle of this species of settler bear-marks in their strength, fat, and fruitfulness, of their being plentifully fed and carefully kept. His table abounds with a variety of the best provisions. His very kitchen flows with milk and honey. Beer, cyder and wine are the usual drinks of his family. The greatest part of the clothing of his family is manufactured by his wife and daughters. In proportion as he increases in wealth, he values the protection of laws. Hence he punctually pays his taxes towards the support of government. Schools and churches likewise, as the means of promoting order and happiness in society, derive a due support from him: for benevolence and public spirit, as to these objects, are the natural offspring of affluence and independence. Of this class of settlers are two thirds of the farmers of Pennsylvania.

These



These are the men to whom Pennsylvania owes her ancient fame and consequence.

If they possess less refinement than their southern neighbours, who cultivate their lands with slaves, they possess more republican virtue. It was from the farms, cultivated by these men, that the American and French armies were fed, chiefly, with bread during the late revolution; and it was from the produce of these farms that those millions of dollars were obtained from the Havanna after the year 1780, which laid the foundation of the bank of North America, and which fed and clothed the American army till the glorious peace of Paris.

This is a short account of the happiness of a Pennsylvanian farmer. To this happiness our state invites men of every religion and country. We do not pretend to offer emigrants the pleasures of Arcadia. It is enough if affluence, independence and happiness are ensured to patience, industry and labour. The moderate price of land\*; the credit which arises from prudence,

\* The unoccupied lands are sold by the state for about six guineas per hundred acres. But as most of the lands that are settled are procured from persons who had purchased them from the state, they are sold to the first settler for a much higher price. The quality of the soil, its vicinity to mills, court-houses, places of public worship, and navigable water; the distance of land carriage to the sea-ports of Philadelphia or Baltimore, and the nature  
of

dence, and the safety from our laws of every species of property, render the blessings which I have described, objects within the reach of every man.

From a review of these different species of settlers, it appears that there are certain regular stages, which mark the progress from the savage to civilized life. The first settler is nearly related to an Indian in his manners. In the second, the Indian manners are more diluted. It is in the third species only that we behold civilization completed. It is to the third species of settlers only, that it is proper to apply the term of FARMERS. While we record the vices of the first and second settlers, it is but just to mention their virtues likewise. Their mutual

of the roads, all influence the price of land to the first settler. The quantity of cleared land, and the nature of the improvements added to all the above circumstances, influence the price of farms to the second and third settlers. Hence the price of land to the first settler is from a quarter of a guinea to two guineas per acre; and the price of farms is from one guinea to ten guineas per acre to the second and third settlers, according as the land is varied by the before-mentioned circumstances. When the first settler is unable to purchase, he often takes a tract of land for seven years on a lease, and contracts instead of paying a rent in cash to clear fifty acres of land, to build a log cabin and a barn, and to plant an orchard of two or three hundred apple trees. This tract after the expiration of this lease, sells or rents for a considerable profit.

wants

wants produce mutual dependance: hence they are kind and friendly to each other. Their solitary situation makes visitors agreeable to them: hence they are hospitable to strangers. Their want of money (for they raise but little more than is necessary to support their families) has made it necessary for them to associate for the purposes of building houses, cutting their grain, and the like: this they do in turns for each other, without any other pay than the pleasures which usually attend a country frolic. Perhaps what I have called virtues are rather *qualities* arising from necessity, and the peculiar state of society in which these people live. Virtue should in all cases be the offspring of principle.

I do not pretend to say that this mode of settling farms in Pennsylvania is universal. I have known some instances where the first settler has performed the improvements of the second, and yielded to the third. I have known a few instances likewise of men of enterprising spirits, who have settled in the wilderness, and who in the course of a single life have advanced through all the intermediate stages of improvement that I have mentioned, and produced all those conveniences which have been ascribed to the third species of settlers; thereby resembling in their exploits not only the pioneers and light infantry, but the main body of an army.

There are instances likewise where the first settlement has been improved by the same family in hereditary succession, till it has reached the third stage of cultivation. There are many spacious stone houses, and highly cultivated farms, in the neighbouring counties of the city of Philadelphia, which are possessed by the grandsons and great grandsons of men who accompanied William Penn across the ocean, and who laid the foundation of the present improvements of their posterity, in such cabins as have been described.

I dare say this passion for migration, which I have described, will appear strange to an European. To see men turn their backs upon the houses in which they drew their first breath—upon the churches in which they were dedicated to God—upon the graves of their ancestors—upon the friends and companions of their youth—and upon all the pleasures of cultivated society, and exposing themselves to all the hardships and accidents of subduing the earth, and thereby establishing settlements in a wilderness, must strike a philosopher, on your side the water, as a picture of human nature that runs counter to the usual habits and principles of action in man. But this passion, strange and new as it appears, is wisely calculated for the extension of population in America; and to this it contributes, not only by promoting the increase of the human species in new settlements, but in the old settlements likewise.

While

While the degrees of industry and knowledge in agriculture, in our country, are proportioned to farms of, from seventy-five to three hundred acres, there will be a languor in population as soon as farmers multiply beyond the number of farms of the above dimensions. To remove this languor, which is kept up alike by the increase of the price, and the division of farms, a migration of part of the community becomes absolutely necessary. And as this part of the community often consists of the idle and extravagant who eat without working, their removal, by increasing the facility of subsistence to the frugal and industrious who remain behind, naturally increases the number of people; just as the cutting off the suckers of an apple tree increases the size of the tree, and the quantity of fruit.

I have only to add upon this subject, that the migrants from Pennsylvania always travel to the southward. The soil and climate of the western parts of Virginia, North and South Carolina and Georgia afford a more easy support to lazy farmers, than the stubborn, but durable soil of Pennsylvania.—*Here* our ground requires deep and repeated ploughing to render it fruitful. *There* scratching the ground once or twice affords tolerable crops. In Pennsylvania the length and coldness of the winter make it necessary for the farmers to bestow a large share of their labour in providing for, and feeding their

cattle; but in the southern states, cattle find pasture during the greatest part of the winter in the fields or woods. For these reasons, the greatest part of the western counties of the states that have been mentioned, are settled by original inhabitants of Pennsylvania. During the late war, the militia of Orange county, in North Carolina, were enrolled, and their number amounted to three thousand five hundred, *every* man of whom had migrated from Pennsylvania. From this you will see that our state is the great out-port of the united states for Europeans; and that after performing the office of a sieve by detaining all those people who possess the stamina of industry and virtue, it allows a passage to the rest, to those states which are accommodated to their habits of indolence and vice.

I shall conclude this letter by remarking, that in the mode of extending population and agriculture which I have described, we behold a new species of war. The third settler may be viewed as a conqueror. The weapons with which he achieves his conquests, are the implements of husbandry; and the virtues which direct them, are industry and œconomy. Idleness, extravagance and ignorance fly before him. Happy would it be for mankind, if the kings of Europe would adopt this mode of extending their territories! It would soon put an end to the dreadful connection which has existed in every  
age

age between war and poverty, and between conquest and desolation.

With great respect I have the honour to be

S I R,

Your most obedient humble Servant,

PHILADELPHIA,  
October 26, 1786.

BENJAMIN RUSH.

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*A PHYSICAL INQUIRY into the POWERS and  
OPERATION of MEDICINES; by THOMAS PER-  
CIVAL, M. D. F. R. S. and S. A. Lond. F. R. S.  
and R. M. S. Edinb. &c. &c.*

CAUSA LATET, VIS EST NOTISSIMA.

OVID.

TO THE LITERARY AND PHILOSOPHICAL SOCIETY.

MANCHESTER, NOVEMBER 25, 1786.

**M**EDICINES are the instruments employed for the preservation of health, or the cure of diseases: It must, therefore, be an object of interesting speculation to the philosopher, and of practical importance to the physician to investigate the rationale of their action on the human body. But there is no branch of

the healing art which is in itself more intricate and obscure; nor any one that has undergone so many doctrinal vicissitudes. It would trespass too much on the time allotted for such discussions, in this Society, to enumerate the multifarious hypotheses which have been supported by the successive sectaries in physic, since the days of Hippocrates. On many of these I have animadverted in a work, published near twenty years ago\*. And I shall now only request your candid attention to a few observations, on the opinions which are beginning to prevail in our schools; and your permission to offer some hints towards the extension of our views, and the methodizing of our experience, relative to this curious and philosophical subject.

Anatomy has now revealed the exquisite structure of our corporeal frame; and physiology has taught us that, in its animated state, the organs of which it is composed are reciprocally connected with, and delicately adjusted to each other. The minutest agent, therefore, may excite a movement capable of being propagated to any part of the system, or even through the whole of it, by a sympathetic energy, independent and far beyond the power of the primary instrument of motion. From these premises it is inferred, agreeably to the simplicity which sub-

\* *Essays Medical and Experimental*, vol. I.



sists in all the operations of nature, that a medicine is only the *cause of a cause*, to adopt a phrase of the logicians; and that its proper action is confined to the nerves or fibres to which it is immediately applied. When received into the stomach, after the first impression on the very sensible coats of that organ, the nature of it is gradually changed, by the solvent powers of the gastric juices: Or, if incapable of being digested into a mild and nutritious chyle, it is carried through the intestinal canal, and ejected as useless and noxious to the body.

Error may be built on the basis of acknowledged, if only partial, truth; and is then most specious in its form, and most authoritative in its influence on the understanding. But the imposition ceases when we extend our views. And I shall endeavour to shew, that the operation of medicines is to be measured by a more enlarged scale than the foregoing hypothesis applies to it, or any other which now occurs to my recollection.

I. Medicines may act on the human body by an immediate and peculiar impression on the stomach and bowels, either in their proper form; in a state of decomposition; or by new powers acquired from combination, or a change in the arrangement of their parts. The sympathy of the stomach with the whole animated system is so obvious to our daily experience, that it

cannot require much illustration. After fasting and fatigue, we feel that a moderate quantity of wine instantly exhilarates the spirits, and gives energy to all the muscular fibres of the body. It has been known even to produce a sudden and large augmentation of weight, after much depletion, by rousing the absorbent system to vigorous action. Such power is peculiar to living mechanism; and is properly denominated, by physicians, the *Vis medicatrix naturæ*. But apparent as is the sympathy of the stomach, the laws by which it is governed are very insufficiently understood: And we have hitherto learned only from a loose induction of facts, that the nerves of this delicate organ seem to be endued with diversified sensibilities; that impressions, made by the same or different substances, have their appropriate influence on different and distant parts; and that the stomach itself undergoes frequent variations in its states of irritability. A few grains of blue vitriol, taken internally, excite instantly the most violent contractions in the abdominal, and other muscles concerned in vomiting. A dose of *ipécacuanha*, as soon as it produces nausea, abates both the force and velocity of the heart, in its vital motions; and affects the whole series of blood vessels, from their origin to their minutest ramifications; as is evident by the paleness of the skin, under such circumstances, and by the efficacy

efficacy of emetics in stopping hæmorrhages. The head, when disordered with vertigo, sometimes derives sudden relief from a tea-spoonful or two of æther, administered in a glass of water. And I have known an incessant cough to attack the lungs, in consequence of the stimulus of a pin, which had been unwarily swallowed. Of the action of medicines on the stomach, under decomposition or recomposition, we have an example, familiar to every one, in magnesia. For this absorbent earth by neutralizing the acid in the *primæ viæ*, acquires a purgative quality, and at the same time yields a gas of great salubrity, as an anti-emetic, tonic, and antiseptic.

II. Medicines may pass into the course of circulation in one or other of the states above described; and, being conveyed to different and distant parts, may exert certain appropriate energies. Chemistry furnishes numberless cases wherein substances undergo changes, and put on new forms more remarkable than can be effected by the digestion of the stomach, retaining still the *materia prima*, and being capable of resuming the original arrangement of their particles, and consequently their original qualities. Now, a body altered in its texture, by the digestive organs, and carried into the system with the aliment, may by such alteration acquire specific powers on particular sound or diseased

eased parts. Thus, if we suppose cantharides to be changed in form and texture, when mixed with the chyle, the lymph, or blood, yet in that form and texture they may be peculiarly adapted to excite strangury in the urinary passages. Or, we may conceive that this new modification of their corpuscles may again be altered, and their original composition restored by a subsequent chemical change in the kidneys; an event not more singular than the separation of urine from the blood, than the revival of a metal, or the precipitation of a solvend from its menstruum by elective attraction. The urinary excretion seems to be designed by nature to carry off the recrementitious parts of the circulating fluids. And it clearly shews what compositions, and decompositions take place in the body. For it varies almost every hour both in the state of health and of disease; and the lateritious, pinky, mucous, and other appearances it exhibits, are the result of chemical changes, either in itself, or in the fluids from which it is derived.

The sensible qualities of any body are no certain criteria of its medicinal action. Peruvian bark owes not its efficacy to bitterness; for stronger bitters are not possessed of its febrifuge powers. Antimony, though insipid, is violent in its operation on the nerves of the stomach: And yet, if applied to the eye, an organ  
endued

endued with equal sensibility, it is entirely inert. To what property in opium, capable of affecting the external senses, are we to ascribe its narcotic powers? Or is there in the grateful taste of *saccharum saturni* any indication of a deadly poison? But the instances are numberless which may be adduced to prove the uncertainty of reasoning otherwise than from observation, concerning the action of medicines, and the peculiar sensibility of different parts of our system to their impression. Following, therefore, experience as our guide, let us notice such facts as may elucidate the subject before us. It is well known that madder root carries its tinging quality to the bones, affecting neither the skin, the muscles, the ligaments, nor fat. Digestion consequently leaves this tinging quality unchanged; or perhaps it is again recovered, when arrived at the bones, by some new arrangement of parts produced by the chemistry of nature. Extract of logwood, taken internally, sometimes gives a bloody hue to the urine. But the astringency of it does not, according to my trials, accompany its colouring matter\*. I recollect no instance

\* It is said the fruit of the Nopal, or Indian fig, on which the cochineal is propagated, tinges the urine of those who eat it with a deep blood colour. The leaves of this shrub are of a permanent and lively green; and it is remarkable that their juices are converted, by the concoctive organs  
of

stance wherein the milk either of a nurse, or of an animal, was tinged with madder or logwood. This affords some presumption that the pigment does not subside, in its proper form, in the blood; but that it is recovered by a subsequent change, in the disposition of its constituent particles. And if one substance stain the bones, by being carried into contact with them, another may, in a way analogous, produce in them fragility or dissolution. In the disease termed by the French *ergot*, and which, with apparent reason, is ascribed to the use of a species of unsound corn, the bones lose the earthy matter that enters into their texture, and become soft and easy to be broken. This effect is gradual, and probably arises from some unknown quality of the corn, which is either not subdued by digestion, or resumed in the juices that circulate through the osseous vessels. A change in the process of vegetation may communicate a dissolvent power to an esculent seed. Mustard acquires it by its natural growth, and is capable

of the insect which feeds on them, into a dye exactly similar to that produced by the powers of vegetation in the pulp of the fruit. Cartheuser obtained from the cochineal a moderately *astringent* spirituous extract, amounting, in weight, nearly to three fourths of the substance from which it was prepared. These facts exhibit a striking analogy between digestion and vegetation, as the products appear to be the same both in colour and quality.

of

of rendering even ivory itself soft and fragile. How far it would produce such an effect on the bones of a living body, if used as the chief article of diet, we have no experience on which to ground any satisfactory conclusion. The peasantry, in the mountainous parts of this country, who live on oat meal, are peculiarly liable to the itch, and to other cutaneous eruptions. These have sometimes been ascribed to obstructed perspiration. But such obstruction is itself only a concomitant effect of some quality in the oat meal injurious to the skin.

Sulphur, whether externally or internally used, produces a cure in the itch. In each way, therefore, we may presume its operation to be similar. But when taken into the stomach, there can be no doubt that it undergoes a change in the modification of its parts, and that it does not circulate through the blood vessels either in the form, or with the properties of sulphur. Yet when conveyed to the surface of the body, it appears evidently to recover its original powers; communicating its peculiar odour to the perspiration, tinging silver, and curing cutaneous discolourations\*. The same holds true of the vitriolic

\* Bishop Watson, in his *Chemical Essays*, warns those who use cosmetic lotions containing cerusse, to forbear from them at Harrowgate, Moffat, or other places where they drink sulphurated waters, "lest they should be in  
" the

vitriolic acid, when administered in large doses. It seems to acquire phlogiston in the animal body, and to pass off by the pores, as hepatic air, or as volatilized sulphur. Even when given to nurses, it proves an effectual remedy for the itch, both in them, and the children whom they suckle. Mercury, combined with sulphur into an æthiops, has been generally regarded as inert. But instances have occurred in which, under this form, though accurately prepared, it has produced salivation; an evident proof of a chemical change in the æthiops, by which the mercury was restored to its pristine powers. Indeed the same reasoning may be applied to the specific action of mercury on the salivary glands, in whatever mode it be administered\*. A ptyalism is sometimes produced by antimony. Dr. James assured my friend Sir George Baker, that he knew six instances of it, occasioned by his fever powder, although he had left mercury out of its composition long before they occurred. But the

“ the state of the unlucky fair one, whose face, neck, and  
 “ arms were suddenly despoiled of all their beauties, and  
 “ changed quite black.” Vol. III. p. 365.

\* We have the concurrent testimony of many authors, that mercury has been found, restored to its original form, in the carious bones of their patients. Vid. Joan. Fernel. cap. 7. Gabriel. Fallop. cap. 78. Joan Languem, lib. I. epist. 43. Alex. Petrom. cap. 1. lib. VI. &c. &c.

patients,



patients, thus affected, had neither their teeth loosened, nor their breath made offensive.

Most persons have experienced the effects of asparagus on the urine\*. This takes place very speedily, and strongly too, even though a small quantity only has been eaten. The smell is much more disagreeable than that of asparagus itself. And as the odorous particles conveyed to the kidneys must be greatly diluted in their passage (even on the supposition of the retrograde motion of the lymphatics, which does not seem probable in a case so invariable and uniform) I should conceive that a new combination of particles takes place in the urinary organs; and that the odorous part of the secretion differs in its form and quality, both from what subsisted in the chyle and in the blood.

There are certain medicines which, when swallowed, quickly manifest themselves in the discharges, with some of their original qualities. Soap lees, when taken in large quantities, render the urine alkaline and lithonthriptic: And the same excretion becomes impregnated with fixed air, if mephitic water be drunk freely. A patient, whom I visit at this time, has six

\* Cabbage, especially that of the winter's growth, impregnates water with a disagreeable smell, somewhat similar to that which is communicated by asparagus. Yet, I believe, cabbage is never known to taint the urine; perhaps from its having no chemical affinity with it.

grains of the Balsam of Tolu administered to him thrice every day; and his urine is strongly scented, even by this small quantity. Fuller asserts of the Balsam of Copaiba, *Urinam odore violaceo minime inficit; illam vero sapore amaro imbuat*. Garlick affects the breath, though applied only around the wrists. The milk of a nurse is, likewise, easily tainted with it. A purgative given to one who suckles will sometimes produce no operation on her bowels, if she be costive, but a powerful one on the child at her breast.—But a still more convincing proof that there may be a renovation of the original qualities of a body, after it has undergone the process of digestion, and other subsequent changes, is deducible from these facts; that butter is often impregnated with the taste and smell of certain vegetables, on which the cows have pastured; that the milk of such cows discovers no disagreeable flavour; neither does the whey nor cheese prepared from it. Now butter is formed first by a spontaneous separation of cream; and secondly by a fermentation of it, that is, by a twofold and successive new arrangement of its elementary parts. By these changes, the original offensive materials in the food of the cow seem to reassume their proper form and nature.

After venæsection the serum of the blood has sometimes appeared as white as milk, whilst the crassamentum retained its natural colour. This  
whiteness

whiteness hath been shewn to arise from oleaginous particles (not unassimilated chyle) floating in the circulating fluids\*; and may serve to explain a fact, recorded by a writer of good authority, on the natural history of Aleppo, that “in certain seasons, when oil is plentifully taken, the people become disposed to fevers and infarctions of the lungs; which symptoms wear off by retrenching this indulgence†.” Some years ago cod-liver oil was annually dispensed, amongst the sick in our hospital, to the amount of fifty or sixty gallons. The taste and smell are extremely nauseous; and it leaves upon the palate a flavour like that of putrid fish. This remedy is most salutary when it operates by perspiration; and the sweat of those to whom it is administered, always becomes strongly tainted with it. An oil of the same kind forms no inconsiderable part of the food of many northern nations; and it is said to penetrate and imbue the deepest recesses of the body‡.

In the Philosophical Transactions for 1750, (vol. I. part. II. p. 295.) Dr. Wright relates an experiment to prove that chalybeates do not

\* See Hewson on the Blood, p. 146.

† See Ruffsels History of Aleppo.

‡ Oil was formerly administered in pregnancy, by Sir William Hamilton, and other experienced physicians, to promote easy delivery: But modern theory has superseded their observation and experience!

enter the blood. He forced a dog, which had fasted thirty-six hours, to swallow a pound of bread and milk, with which an ounce and a half of green vitriol were mixed. An hour afterwards he opened the dog, and collected from the thoracic duct near half an ounce of chyle, which assumed no change of colour when the tincture of galls was dropped into it; though it acquired a deep purple from the same tincture, when one fourth of a grain of *sal martis* had been dissolved in it. This experiment is usually deemed decisive in support of the theory, that chalybeates exert their operations solely on the stomach; and that the vigour they communicate to the system arises, exclusively, from their tonic powers on the alimentary canal, and on the sympathy of the stomach with various other parts of the body. I am not inclined to doubt either the tonic action or the sympathy supposed; but I see not that they preclude the immediate agency of steel on remote parts of the human frame. For this remedy, in other forms capable of being introduced into the circulation, may exert considerable energy, as deobstruent, stimulant, or astringent. And the experiment adduced only evinces, that it did not subsist in the chyle as a vitriol, qualified to strike a black colour with galls. Neither does the calx of iron, nor the glass of iron possess this power: Yet, though changed, they are both capable of being restored

to

to it. Perhaps, with equal reason, it might be presumed, by one ignorant of chemistry, that *sal martis* contains no iron, because it is not acted upon by the load-stone.

With the foregoing observation of Dr. Wright, I shall contrast those made by the celebrated Dr. Musgrave, which are also recorded in the annals of the Royal Society. "I injected," says he, "into the *jejunum* of a dog, that had, for a day before, but little meat, about twelve ounces of a solution of indigo in fountain water, and after three hours opening the dog a second time, I observed several of the lacteals of a bluish colour, which, on stretching the mesentery, did several times disappear, but was most easily discerned when the mesentery lay loose, an argument that the bluish liquor was not properly of the vessels, but of the liquors contained in it. A few days after this, repeating the experiment in another company, with the solution of stone blue, in fountain water, and on a dog that had been kept fasting thirty-six hours, I saw several of the lacteals become of a perfect blue colour within very few minutes after the injection. For they appeared before I could sew up the gut.

"About the beginning of March following, having kept a spaniel fasting thirty-six hours, and then syringing a pint of deep decoction of stone blue, with common water, into one of

“ the small guts ; and after three hours opening  
 “ the dog again, I saw many of the lacteals of a  
 “ deep blue colour, several of them were cut,  
 “ and afforded a blue liquor, some of the decoc-  
 “ tion, running forth on the mesentery. After  
 “ this I examined the *ductus thoracicus*, (on which,  
 “ together with other vessels near it, I had on  
 “ my return made a ligature) and saw the *recep-*  
 “ *taculum chyli*, and that *ductus* of a bluish colour ;  
 “ not so blue indeed as the lacteals, from the so-  
 “ lution mixing, in or near the *receptaculum*, with  
 “ *lympba* ; but much bluer than the *ductus* used  
 “ to be, or than the lymphatics under the liver,  
 “ with which I compared it, were\*.”

Stone blue is a preparation of cobalt, pot-ash,  
 and white lead ; which, being converted into  
 glass, is ground into a fine powder. And if  
 such a substance can pervade the lacteals, we  
 may conclude that they are permeable to other  
 bodies, besides those designed for nutrition, and  
 capable of assimilation with the blood. This ar-  
 gument, from analogy, receives great additional  
 force from the known fact that mercury, and  
 various other active remedies, may be conveyed  
 into the body through the absorbents of the skin,  
 a system of vessels, similar to those above-men-  
 tioned, in their structure, uses, and termination.  
 In a case of *hydrocephalus internus*, on which I

\* See Philosoph. Trans. abridged by Motte, chap. IV.  
 part II. p. 76.

have lately been consulted, a child under one year of age received, by successive frictions, four ounces, six drachms, and two scruples of the *unguentum cæruleum fortius*, between the eighth of February and the seventh of April 1786. One scruple was administered each time; the operation took up more than half an hour; and the part, to which the ointment was applied, was always previously bathed with warm water; precautions which seemed to secure the full absorption of the mercury\*. I should not omit to mention that the child recovered without any symptoms of salivation, and continues perfectly well. Indeed I have repeatedly observed, that very large quantities of the *unguentum cæruleum* may be used in infancy and childhood, without affecting the gums, notwithstanding the predisposition to a flux of saliva, at a period of life incident to dentition. The practicability of curing the *hydrocephalus internus* is a late and happy discovery; and perhaps the peculiar efficacy of quicksilver, in this alarming dis-

\* Thirty-seven grains of calomel were given internally, during this space of time, at proper intervals, and in sixteen doses. The case referred to occurred in London, and was under the immediate direction of several physicians of eminence. The use of mercury was adopted by my advice; and the estimate of the quantity consumed, as made by the apothecary, has been transmitted to me by G. H. Esq. the father of the child.

case, may reflect some light on the general rationale of its action. The structure of the brain is yet very imperfectly known; but anatomists have sufficiently ascertained, that it is most copiously supplied with vessels of every order, so that about one tenth of the whole mass of blood circulates within it, although the weight of the encephalon does not exceed one fortieth part of the whole body\*. On this large system of vessels, mercury may be presumed to act with a force proportionate to its magnitude and extent. And, in the instances when no salivation takes place, it is not unusual for profuse sweatings to occur about the head. An acceleration of growth, also, to an extraordinary degree, is frequently observed, after the disease has been thus subdued. In one case, which fell under my direction in 1784, a young lady, nine or ten years of age, of a noble family in this county, increased in stature, two inches, within the space of four months, succeeding her recovery.

Whence is it that a medicine, so irritating as mercury, can be conveyed into the course of circulation, when even milk, or the mildest liquors, if transfused into the blood vessels, have been found to produce convulsions and death? Is it that what passes by the lymphatics or lacteals

\* See Monro on the structure of the nervous system, p. 3, folio.



is carried into the thoracic duct, and there mixed with a large portion of the chyle and lymph, by which its acrimony is sheathed and diluted, or its chemical properties changed, before it enters the mass of blood? For the absorbents of the skin, and of the intestines, should seem to require a capacity to bear the stimulus of those extraneous bodies to which, in both situations, they are exposed.

III. Medicines introduced into the course of circulation may affect the general constitution of the fluids; produce changes in their particular qualities; superadd new ones; or counteract the morbid matter, with which they may be occasionally charged. By observations on the hæmorrhages, which have been sustained without destruction to life; from experiments made on animals, by drawing forth all their blood; and by a computation of the bulk of the arteries and veins\*; the mass of circulating fluids has been estimated at fifty pounds, in a middle-sized man; of which twenty-eight pounds are supposed to be red blood. Fluids, bearing so large a properties to the weight of the whole body, have assuredly very important offices in the animal œconomy. Endued with the common properties of other fluids, they are subject to *mechanical laws*; being variously compounded,

\* Vid. Halleri Prim. Lin. sect. CXLIX.

they are incident to *chemical* changes; and, as they are contained in a living vascular system, their motions become subject to the influence of nervous energy.

But the prosecution of this subject will exceed the bounds of the present evening's discussion: And I shall reserve what I have further to advance upon it to some future meeting of the Society.

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OBSERVATIONS *concerning the VITAL PRINCIPLE*;  
by JOHN FERRIAR, M. D.

READ FEBRUARY 7, 1787.

Quibus ipsis nostrum (sc. humanum) ingenium optimè potest cognosci, quod vilia, sensibus obvia et facilia, ac simplicissima despicit; ad ignota vero, obscura et magnifica magno impetu fertur. HOFFMAN.

**P**HILOSOPHERS have generally supposed the human body to possess a living power, independent of the mind. This opinion arose at a very early period, and prevailed, with little interruption, till the origin of the eclectic philosophy; the revival and confirmation of the doctrine have been attempted, by some eminent physiologists of our own times. The doctrines of pneumatology have, indeed, little influence  
on

on medical theories at present, but the opinion of a vital principle is chiefly directed, to explain those actions of the living body, both in health and disease, which become the most important objects of a physician's attention; and as it seems calculated to restore the theory of occult qualities, under the specious title of principles, should it extend itself among persons less enlightened than its present defenders, a view of its foundation, and its connection with facts, becomes desirable.

The immateriality of the soul was admitted by most of the ancient philosophers\*, but the reciprocal action of the soul and body on each other, in the phænomena of sensation and voluntary motion, were not easily explained on that supposition. To get rid of this difficulty, Plato, improving perhaps on the opinion attributed to Pythagoras†, proposed that of a plastic nature, incorporeal indeed, but without consciousness‡, and forming the medium between the soul and body. This doctrine appears to have been variously modified by different sects, but believed, to a certain extent, by all till the time of Aristotle. Mr. Barthez, in his learned

\* That is its distinction from matter, though not in the sense of the modern immaterialists.

† Of an Anima Mundi, from which the souls of men were emanations. Vell. in Cic. de Nat. Deor.

‡ Cudworth's *Intellect. Syst.* p. 158, 165, 166.

treatise on this subject, alledges that the Stoics held the existence of a vital principle\*. Aristotle is represented, by some†, as following the Platonic theory, because he distinguished the mind into the *intellectus agens et patiens*; but he is vindicated against former assertions of the same kind, by Sennertus‡, who explains his meaning to be, that the mind operates in two distinct ways, in consequence of being affected by two distinct classes of perceptions; consequently, that the distinction implies only a *differentia in anima: Intellectum agentem et patientem non realiter et essentialiter, sed ratione tantum distingui*. It appears, however, that most of the Peripatetics understood Aristotle's expressions in a sense favourable to the plastic nature. Physicians had always admitted the existence of the vital principle, under the title of the *calidum innatum*§. Some of the first restorers of letters also, adopted this opinion, with different modifications¶; and during a considerable part of the last century, a regular system

\* Nouv. Elem. de L'Homme. C. II.

† Cudworth, p. 165. & seq.

‡ Sunt plurimi, qui intellectum agentem, vel deum, vel alium aliquem demonem seu intelligentiam, homini assistentem statuunt. Verum enimvero et ab Aristotele et a veritate horum opinio aliena videtur. Epit. Physic. p. 82.

§ Sennert. sub titulo. Barthez Nouv. Elem. chap. II.

¶ Vid. Brucker. Hist. Crit. Philos. T. V. p. 50, 136, 943.

prevailed,

prevailed, by which the vital principle was reckoned the efficient cause of generation and existence, in all animals and plants. It then took the name of the *anima vegetans* \*. Paracelsus changed this term, in his philosophy, for that of sidereal spirit, which he believed to be equally independent of the body and the mind †, and to descend from the firmament, as the rational soul proceeded from the Deity ‡. This doctrine was very serviceable to the demonologists §. Van Helmont, among other improvements of the Paracelsian system, suggested the theory of the Archæus, without venturing to assert the unity of the rational and living souls ¶. The actions of the Archæus were afterwards reduced, by Stahl, to operations of the rational soul; but Descartes appears to have been the first modern philosopher, who rejected the separate existence of the vital principle, under all denominations ¶. He availed himself of the progress which was made in the nervous physiology not long before, by Willis and others, to form an hypothesis of the vital functions, founded on the supposition of the

\* Alsted. Encyclop. T. I. p. 603.

† Brucker. T. V. p. 324.

‡ Id. IV.

§ Mor. Antid. adv. Atheismum. Glanville's Considerations.

¶ Barthéz, chap. I. He sets Lord Verulam at the head of the modern supporters of the vital principle, p. 23.

¶ Id. p. 16.

nervous fluid, or animal spirits, in the language of that time\*.

The doctrine of Stahl made very considerable progress. Cudworth, from his anxiety to reduce every thing to the Platonic system, attempted to shew a similarity between the Archæus and the Plastic power†; he was a true believer in the independent principle. But the supposition of a rational power, which, according to the chemists, originally formed the body, and afterwards directed all its actions, in health and disease, does not agree with Cudworth's own account of the plastic nature, which he acknowledges to be destitute of consciousness‡. Willis undoubtedly supported the notion of an *anima vegetans*||; but the opposers of Stahl were not uniform in their sentiments. The mechanical physicians paid little attention to this question, and for a long time the terms of nature, sensitive soul, and vital principle were employed, without much discussion, consequently, with little clearness of apprehension. The existence of a nervous fluid was now assumed, independently of the sensitive soul, to explain the appearances of sensation and volun-

\* Brucker. T. IV. p. 324

† Intellectual System, p. 167.

‡ Id. p. 158.

|| Barchusen. Hist. Med. sub tit. Willis.

tary motion\*. At length, Dr. Haller, asserted an inherent power of contraction in muscular fibres†, without excluding any other principle of motion, in which he was followed by Dr. Gaubius‡. About the same time Dr. Whytt of Edinburgh attempted a reformation of the Stahl-ian doctrine§, to the exclusion of the independent living principle. He supposed, however, with Stahl, the vital, and other involuntary motions to have been produced, at first, by an effort of the will, but to have become mechanical, like the common actions of many voluntary muscles, in consequence of habit. This doctrine was partly opposed to the pre-established harmony of Leibnitz§; for it is observable, that the balance of rectitude in reasoning is commonly preserved, by opposing, to the excess of any opinion, the excess of its contrary.

Some philosophers began at length to imagine that matter might acquire vitality, in conse-

\* Hoffman, Proleg. C. III. De Secr. fluid. tenuiss. L. I. S. 3.

† Physiolog. T. I. p. 465. ‡ Pathol. S. 170.

§ Essay on the Vit. and Invol. Motions.

§ This is the sum of Leibnitz's theory; anima suas sequitur leges, et corpus itidem suas: conveniunt vero inter se, vi harmoniæ inter omnes substantias præstabili, quoniam omnes sunt representationes universæ.

BRÜCKER, T. V. p. 428.

quence of a certain organization\*. But while no single hypothesis respecting the vital principle prevailed generally, two theories appeared, which engaged attention by the eminence of their authors, as well as by their own nature. Dr. Monro accounts for the commencement of the involuntary motions, and some other phænomena, on the supposition of a living principle, pervading the universe†; similar, I apprehend, to the plastic nature of the Platonists. Mr. Hunter attributes to the blood, a power of forming and renewing parts, by its proper efforts, apparently carried, in some cases, almost to a degree of rationality‡. It is sufficient to prove the great differences among modern physiologists, on this subject, to observe, that while Dr. Hoffman has distinguished, in very strong terms, between the sensitive and rational souls||, Dr. Cullen allows, that

\* Hoffman, T. I p. 18. Buffon, *Histoire Naturelle*

Since this Essay was written, Dr. Fordyce has attempted to account for muscular motion on the theory of a peculiar attraction, which he terms the *attraction of life*. But, as I had occasion to observe elsewhere, there is too much design in muscular action to be mechanically explained, nor would our perplexity be at all diminished, by receiving an explanation which is fully as obscure as the cause of the phenomena to which it relates.

† Observ. on the Nervous System, p. ult.

‡ Med. Commentaries, vol. II. p. 198.

|| *Magna utriusque est differentia, et diversa plane ratio; ideoque deoque ambo non pro uno eodemque habenda . . . sed probé*



that this distinction is only nominal, or, as Sen-  
nertus expresses it, a *differentia in anima*\*.

Two general reflections occur, on this imper-  
fect view of the progress of opinions respecting  
a vital principle; that the chief difficulty con-  
sisted, in the persuasion that matter is totally  
inert, and insusceptible of sensitive life, by any  
organization, which Hoffman justly calls *infeli-  
cissimum dogma*†; and that systematic distinctions,  
in this, as in other cases, have been mistaken  
for essential differences.

Accordingly, inconsistencies are to be found  
in several of these opinions; thus Dr. Haller  
assigns two distinct powers, the *vis nervæ*, and  
*vis insita*, for producing the simple action of one  
muscle; and though the nervous system is ge-  
nerally allowed to be the medium of sensation  
and voluntary motion, yet Dr. Gaubius has  
contrived to exclude this vehicle of the living  
power from the title of the vital solids; *Vis vitalis  
solidi est, qua id ad contactum irritamenti se contrahit,  
crispat*. It is well known that the nerves have no  
power of contraction. Gaubius must have sup-  
posed the existence of a nervous fluid to be granted,  
in forming this definition, for it does not appear,

probè ratione diversarum operationum, quæ discrepantem  
etiam essentiam produunt, sunt distinguenda. T. I. p. 88.

\* Instit. of Med. sect. XCVII.

† Proleg. cap. III.

from other parts of his Pathology, that he meant to exclude the nervous system. Dr. Haller's theory of the *vis insita* was formed from a variety of experiments on living animals, by which he found the irritability of muscles to remain, long after their connection with the brain was destroyed\*. But the experiments of Dr. Monro†, Dr. Whytt‡, and Dr. Smith§, prove that there is no real distinction between the *vis insita* and the nervous energy. This dispute is so well known, that a particular account of the arguments and experiments is unnecessary; and some of the strongest will be produced in the course of our inquiry. Galen, from similar observations with Dr. Haller, had drawn the same conclusion with respect to the motion of the heart§.

Dr. Whytt, with an inaccuracy surprizing in so acute a physiologist, supposes the soul to be present in different parts of the brain at the same time, while he considers the soul as immaterial and unextended¶. Nay, he asserts that when contraction takes place, on the irritation of a separated muscle, the action happens from the influence of part of the soul contained in the separated part\*\*. Yet he complains that Dr.

\* Physiolog. T. I. p. 426 to 466. Id. T. IV. p. 516.

† Obs. on the Nerv. Syst.

‡ Obs. on Irritab. and Sensib. p. 310, (of the Quarto edit.)  
§ Dissert. Inaugural.

§ Van Swieten Comment. T. I. p. 3. 4.

¶ Vit. & Inv. Mot. p. 202. \*\* lb.

Haller charges him with making the soul divisible.\* Dr. Whytt admits, also, contrary to experiments, the Stahlian doctrine of universal sensation†; a doctrine clearly disproved, by the effect of ligatures, or division of nerves, in the living animal. While he combats the *vis insita*, he produces some facts which contradict his own theory of the involuntary motions, and seem to shew, that the motions of those organs may be explained from the stimulus of the contained fluids. Thus, the power of stimuli applied to any muscular part, even to a voluntary muscle, is greater than the power of the will over that part‡, and the peristaltic motion of the intestines sometimes continues, after the action of the heart has ceased§, from the stimulus of their contents. And Dr. Whytt is obliged to confess, that the mind has no concern, as a rational agent, with the coalescence of the *ductus arteriosus* & *ductus venosus* after birth§; for the mind is not even conscious that such parts have ever existed, and their circumstances are only known by anatomical investigation.

Dr. Monro explains his opinion of the *intellectus agens*, in the human body, in these few

\* Ib. p. 128.

† Ib. p. 14.

‡ Ib. p. 192. Dr. Haller says, *Vox (vis vitalis) non perinde placet, cum vis nostra vitæ aliquantum supervivat.* *Physiolog. T. IV. p. 464.*

§ Vit. and Inv. Mot. p. 169.

words ; “ that the power which created all things, “ which gave life to animals, and motion to the “ heavenly bodies, continues to act upon, and to “ maintain all, by the unceasing influence of a “ living principle pervading the universe, the “ nature of which our faculties are incapable of “ duly comprehending\*.” But this theory seems liable to the same objection with the notion of a plastic power ; that neither of them affords a satisfactory explanation of the phenomena of sense and motion. For the plastic power, or living principle, must be either material or immaterial : if it be material, then it must be allowed that matter, as matter, is susceptible of life ; now as the existence of the plastic power is merely assumed, we have a right, in this case, to suppose that the body acquires vitality by a certain degree of organization, as a preferable hypothesis. But if the plastic power be declared immaterial, its action on matter is as difficult to be conceived, as the action of an immaterial mind on the body, and consequently nothing is gained but a term by the supposition. If the living power be supposed to be an immediate act of the Deity, an opinion which has been held by many philosophers†, this is liable to still stronger ob-

\* Conclusion of Obs. on the Nervous System.

† Sennert. Epitom. Phys. p. 82. Alsted. Encyclop. p. 530.

jections ;

jections; for the consequence would be, as it is urged by one of Cicero's speakers, *cum miseri animi essent, quod plerisque contigeret, tum Dei partem esse miseram, quod fieri non potest*\*. If it be said that the living principle, on this hypothesis, is the connecting medium between the mind and the body, this supposes the Deity to act subordinately to the human mind, which cannot be admitted.

When Mr. Hunter's doctrine of the life of the blood was first proposed, it was said to be a revival of an opinion suggested by Dr. Harvey†. A very similar theory, however, prevailed long before Dr. Harvey: Galen made the heart the seat of the *calidum innatum*, and Sennertus expressly says, that the heart and arteries form and contain the vital power‡. Since the time of Dr. Harvey, the life of the blood has been asserted by several authors of eminence. Willis says, *Sanguinis animationem, non solum placita philosophorum, sed indubitata sacre scripture testimonia planè asserunt*§. Hoffman employs the same argument to prove the same assertion, and he elsewhere expressly

\* De Nat. Deor.

† Medical Comment. vol. II. p. 198.

‡ Instit. Med. p. 338. Nothing could have prevented this able writer from attributing life to the blood itself, but his belief in the common persuasion, that the right ventricle of the heart contained air alone.

§ De Mot Musc. p. 71.

mentions that the blood contains the vital principle\* The same opinion may be found in practical authors, particularly in Huxham,† who even mentions the red globules as the peculiar seat of life.

Mr. Hunter is said “ to consider a muscle cut  
“ out of the body to be alive as long as it con-  
“ tinues capable of being acted upon by stimuli  
“ of any kind‡;” and to be of opinion, “ that  
“ the particular parts of an animal body have a  
“ principle of life, independent of the effect  
“ which arises from their union as one system§.”  
The proof of these propositions, it will be readily seen, is included in that of the particular doctrine they are advanced to support.

Mr. Hunter “ alledges that, in the nature of  
“ things, there is not a more intimate connection  
“ between life and a solid, than between life and  
“ a fluid §;” this argument is inconclusive; for we cannot, *a priori*, ascertain the degree or species of organization requisite to a vital part.

Mr. Hunter’s first direct proof of the life of the blood is, that it unites living parts when effused between them¶. That living parts unite, in some cases, in consequence of mutual con-

\* Tom. I. p. 33.

† Essay on Fever.

‡ Medical Comment. ubi sup.

§ Ib. p. 199.

¶ Id. Ib.

¶ Medical Comment. ubi sup.

fact, is certain; but it is by no means certain that this union is effected by an interposed fluid\*, because the phænomenon admits of a more probable explanation, which comes under the next observation.

The second direct proof of the life of the blood† is, that the blood becomes vascular, like other living parts: and “Mr. Hunter has a preparation, “in which he thinks he can demonstrate vessels “rising from the centre of what had been a “coagulum of blood, and opening into the “stream of the circulating blood‡.” That such an effort should take place, in the centre of an effused fluid, not affected by external impulse, is inconceivable, except on the supposition that the blood is a rational as well as a living fluid, and possessed of muscular fibres, or some similar organs. And granting the blood to be rational, it is much more likely that the first attempt towards a reunion of separated parts should be made at the orifices of the divided vessels where the operation would be easiest, than in the centre of the fluid effused between them; that is, there will be an elongation of the divided vessels. And that this does actually take place, appears from Dr. Mon-

\* It is well known that if the opposite branches of two healthy trees be tied together, they will coalesce, although no incision had been made in either, nor any part of their bark removed.

† *Ib.* p. 200.

‡ *Id.* *Ib.*

ro's experiments on this subject\*; in Dr. Monro's plates, the new vessels are evidently of larger diameter where they join the divided vessels than in the centre of the newly formed part; nay, in a newly formed piece of skin, in plate 46th, the new vessels, instead of proceeding from a common point, come in, tapering from the sides, to form a circle round the centre.

The third direct proof of the life of the blood† is, that its temperature, as it flows from the vein, is always equal, in the most opposite temperatures to which the body can bear exposure. This certainly proves the power generally ascribed to the living body, of preserving its own temperature, to a certain degree, notwithstanding the action of external heat or cold, but till the action of the vessels in this case can be done away, the fact will furnish no exclusive evidence in favour of the life of the blood.

Mr. Hunter's fourth direct argument is, that blood is capable of being acted upon by a stimulus‡; the proof of which is, that "blood coagulates from exposure, as certainly as the cavity of the thorax or abdomen inflames from the same cause||." But as the spontaneous separation of the constituent parts of the blood may be

\* Observations on the Nervous System, p. 86.

† Med. Com. p. 200.

‡ Med. Com. p. 201.

|| Ibid.



very well explained on mechanical and chemical principles, it is unphilosophical to recur to any others, and in fact the life of the blood must be taken for granted, before this phænomenon can be referred to it: for we might with equal probability ascribe the freezing of water to a living power. If the blood, in cases of violent inflammation, be later in coagulating than the blood of healthy persons\*, it is readily explained by the more intimate mixture of the parts of the blood, effected by the increased action of the vessels, which prevents the difference of the specific gravity of each part from acting so speedily as usual.

The fifth direct proof is, the nourishment and preservation of life in paralytic limbs†. In reply to this it may be observed, that the continuance of circulation in a paralytic limb may be explained on common principles, therefore the the introduction of a new power, to account for the phænomenon, is unnecessary. The explanation to which I allude, is derived from the stimulus of the blood (which does not imply its life) exerted on the containing vessels; from the impulse given by the *vis a tergo*, and from the sympathy which prevails, through the arterial system, among the contracting fibres of the

\* Ibid.

† Id. Ibid.

vessels\*. Besides, the experiments of Dr. Langrish and Dr. Schwenke prove that tying up the artery of a limb does not prevent the motion of the limb; now by the consent of all supporters of a vital principle, the character of that principle is, that it enables a muscle to contract; but in this case a limb is moved long after circulation is stopped in it; the blood therefore does not appear to contain a vital principle. “Dr. Langrish tied up, and cut asunder, the carotid and both the crural arteries of a dog, without destroying the motion of any muscle; and Dr. Schwenke assures us, that, after having tied up the crural arteries of a dog close to the groin, the animal continued to move his leg and foot for a whole day †.”

While the particular doctrines of the vitalists are exposed to these objections, some direct arguments may be brought against the general supposition of an independent living principle: the arguments are of two kinds; refutations of the general proofs offered in support of the vital principle, and instances of the direct influence

\* This sympathy is most observable in diseases. Spasmodic affections of the heart are often attended with shooting pain in one or both of the humeral arteries. To this cause the pain felt in one arm, in cases of hydrothorax, must probably be ascribed.

† Whytt, *Vital and Invol. Motions*, p. 6.

of

of the mind and brain over what is termed the independent living principle.

The proofs most strongly insisted on, for the support of the vital principle, are, the contraction of muscles separated from the body, on the application of stimulants\*; the performance of the vital and involuntary motions, without any exertion or even consciousness of the mind†; and the birth of full-grown foetuses destitute of a brain‡. In all these cases, something is alleged to operate, independently of the mind, in producing muscular motion.

In answer to the first argument, drawn from the contraction of separated muscles, it may be said,

1. That the power of contraction, in a separated muscle, is lost before putrefaction takes place||, that is, before its texture is destroyed; but if its vitality depended on its texture, this ought not to happen.

2. The power of contraction, in a separated muscle, is strongest upon its first separation, and becomes weaker by degrees§; therefore the contracting power appears to have been derived

\* Haller. Elem. Phys. tom. I. p. 462.

† Monro's Obs. on the Nerv. Syst. p. 102.

‡ Id. p. 26.

|| Haller. The power of contraction is lost in man, in a very few hours; in cold-blooded animals, within twenty-four hours.

§ Whytt.

from some source from which it is detached by the excision of the part.

3. Irritation of the medulla oblongata, or of the nerves supplying particular muscles, occasions stronger contractions than irritation of the muscles themselves\*. The same author to whom I owe this observation, furnishes an experiment, directly proving that the action of separated muscles depends upon the nervous energy. "Five minutes after taking out the heart of a frog, I injected a solution of opium into its stomach and guts. In less than half an hour it seemed to be quite dead; for neither pricking nor tearing its muscles produced any contraction in them, or any motion in the members to which they belonged. After cutting off its head, a probe pushed into the spinal marrow made its fore-legs contract feebly†." Here, in an animal so tenacious of life, as commonly to hop about vigorously long after the heart is taken out, or the head cut off, the irritability of the muscles, or, in other words, the living principle, is destroyed by the application of opium to the stomach and intestines. Now, circulation being previously stopped, by taking out the heart, the opium could only act on the nervous system, which was still entire, and the nervous power being destroyed by the opium,

\* Whytt Vit. and Inv. Mot. p. 10.

† Obs. on Irrit. and Sens. Exp. II. p. 310.

the irritability of the muscles, that is, the living principle, is also destroyed, and their destruction is simultaneous. The last part of the experiment proves their identity, when the irritability of the muscles is restored, by exciting the small remainder of nervous energy contained in the spinal marrow.

4. Dr. Haller himself is obliged to make a concession, on this subject, sufficient to destroy his favourite hypothesis of the *vis infinita*\* : *Adparet causam motus equidem per nervos dimitti, ceterum quæcunque ea causa fit, aliquamdiu tamen in nervo integram et efficacem superesse, "et si nervus a cerebro separatus eam causam nuper non accepit."* The permanency of the cause of motion, after the separation of a muscle from the source of that cause, may be well illustrated, by the duration of impressions on our senses, after the exciting cause is removed; as in the experiment always quoted to this purpose, of the circular appearance of an ignited body kept in rotatory motion.

5. When a paralytic limb is convulsed by the electric shock, the motion never takes place without the patient's consciousness. In this case there is no distinction between the vital principle and that exertion, which, in voluntary motion, is always attributed to the mind.

\* Physiolog. tom. IV. p. 338.

In answer to the second argument in favour of a vital principle, drawn from the performance of the vital and other involuntary motions, I shall content myself with observing at present, that allowing the organs of those motions to be supplied with nervous energy, which cannot be denied, their motions may be very well accounted for, by the stimulus of their contained fluids\*. It may be added, that the principal nerves of the heart and lungs are chiefly sent from the brain: this circumstance, as the parts are situated very near the spine, and at a considerable distance from the brain, is a little puzzling to the vitalists.

The force of the third argument, drawn from the want of a brain in full grown foetuses, is taken off by Dr. Whytt, who remarks, that as the heart is sometimes wanting in full-grown foetuses, the argument would equally prove, that the heart is not necessary for the continuance of circulation, as that the brain is not necessary to the support of the system. Accordingly, foetuses born without a brain do not generally survive birth†. Dr. Haller supposes, with great probability, that in these cases the brain is not wanting originally, but is destroyed by disease, during the growth of the foetus.

\* See page 6.

† Haller. *Phyf.* tom. IV. p. 356.

Besides the general supposition of an independent living principle, an inference has been drawn, from the facts we have noticed, of a nervous energy, independent of the brain. It may therefore be proper to explain the sense in which the uncertain term of nervous energy is employed in this essay, lest it should be confounded with the notion of a vital principle. By this term then, I mean that condition, derived from the brain, to different parts of the body, by means of which they become capable of motion. In this definition I allude to no theory respecting the nature of the soul, nor respecting the specific nature of the nervous energy, but confine the terms to facts. The proof of the definition will appear, from the arguments I am going to mention.

To shew, by direct proof, that there is no independent vital principle, I would observe,

1. That it is justly urged by Dr. Monro\* against the doctrine of the *vis insita*, that there is too much design in the actions of different muscles, affected by different stimuli, to be the effect of mere mechanism. This argument is strongly against the existence of a vital principle. Thus, when the hand or foot is burnt, or otherwise suddenly injured, the muscles on the part immediately stimulated are not thrown into

\* Observations on the Nerv. Syst. p. 95 to 99.

action,

action, nor the muscles on the side irritated; but their antagonists contract immediately and strongly\*: if the back of the hand, for instance, be suddenly irritated, the extensors of the hand are not affected, but the flexors are thrown into instant and violent action, to remove the limb from the offending cause. Now if the instantaneous action be, in this case, chiefly produced by an effort of the mind, the supposition of a distinct vital principle is superfluous; if it be said to be produced by the living power independent of the mind, then there must be a rational power in the body, independent of the mind, which is absurd.

2. The state of the vital and involuntary motions is considerably affected by the state of the mind. Respiration is, to a certain degree, under the direction of the will: the action of the heart is very quickly and powerfully varied by the workings of the passions; and even the secretions are frequently changed, in quantity and quality†, by the same cause. But farther, these motions are often suspended by a sudden affection of the mind, as in the case of fainting, which is produced very commonly by an impression made on the mind, without the suspi-

\* Whytt, Vit. and Inv. Mot.

† The bite of an enraged man has been known to prove fatal, in consequence of the poisonous quality of the saliva. HOFFMAN, tom. I.



cion of any bodily cause; and the impression is sometimes so powerful as to put an entire stop to the vital motions, and thus produce death. Again, organic lesions of the heart and lungs have been observed to take place from extremes of passion; and particularly, in Mesmer's operations of animal magnetism, several persons spit blood by the mere strength of imagination\*. All these facts equally disprove the existence of a separate vital principle, and prove the dependance of the nervous energy upon the brain.

3. It is acknowledged, that in maniacal cases, the principal part of the disease consists in depraved perception; and this depravation implies a change in the medium of perception, that is, in the brain and nervous system. Now it is well known that madness is frequently produced by causes purely mental, and in persons apparently in good health. And as the patient's sensibility to very powerful stimuli is much diminished in maniacal cases, they afford another proof of the subordination of the nervous energy.

4. Writers of unquestionable credit have observed, that, in paralytic cases, motion is frequently destroyed, while sense remains†; as

\* See the Report of the Commissioners.

† Haller. Phys. tom. IV. p. 390.

the cause of palsy almost always resides in the brain, this fact appears equally inexplicable, on the opinion of a distinct living principle, or of a nervous energy independent of the brain.

5. When nerves are regenerated, after being cut through, sensation and voluntary motion are not always restored to the parts beneath the division: the restoration was never made in Dr. Monro's experiments\*. But on the supposition of a distinct nervous power, the nerve, after its re-union, ought to resume all its offices.

6. Dr. Whytt asserts, that when the spinal marrow of a frog is destroyed, after decollation, no contraction can be excited in the limbs by cutting or tearing the muscles†.

While so many doubts occur respecting the proof of a vital principle, and while the supposition includes so many difficulties, in its own nature, it is allowable to suspend our judgment on the subject, till more convincing proofs of its existence shall appear, than have as yet been offered to the public.

At present, it is evident that we gain nothing by admitting the supposition, as no distinct account is given of the nature or production of this principle, and as an investigation of facts seems to lead us back to the brain, as the source of sensibility and irritability.

\* Observations, p. 27.

† Obs. on Irritab. and Sensib. p. 284.

In the course of this paper, I have uniformly considered the action of the mind and brain on the body as identical, without reference to the question of materialism, because with respect to our facts, and indeed to all medical facts, this notion is sufficiently complete. I have also avoided all disquisitions respecting the peculiar nature of the nervous energy, convinced, that in the present state of our knowledge it is of more consequence to examine one opinion, which is said to be supported by facts, than either to reject or advance many plausible hypotheses. I have purposely omitted to consider the application of the doctrine of a vital principle to pathology, as the subject would lead to disquisitions inadmissible by the rules of the Society.

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*On the COMPARATIVE EXCELLENCE of the SCIENCES  
and ARTS ; by Mr. WILLIAM ROSCOE. Com-  
municated by Mr. M. NICHOLSON.*

READ MARCH 28, 1787.

**T**HERE is perhaps no circumstance more injurious both to our improvement and happiness, than a propensity to engage, and persevere, in the study of particular branches of  
Vol. III. R science,

science, without first taking that enlarged and general view of our nature and destination, by which we ought to ascertain, and arrange in due succession the proper objects of our pursuit. For want of attention to this important subject, learning and industry have frequently been exerted on unworthy objects; and genius and taste trifled away, without either affording advantage to mankind, or obtaining reputation to their possessor.

If, from the time of our entrance on the world, we were enabled fully to exercise those powers of mind which are but gradually unfolded, this would be the first consideration which would suggest itself to a rational being; and though those powers are developed only by degrees, yet there is a period in the life of every man, when collecting together those ideas, which have been suffered to wander almost unrestrained over the fields of amusement, it behoves him to consider with serious attention that tablet, which is to contain, in eternal colours, the picture of his future life; and, like a skilful artist, to observe what requires his first attention, and what are only secondary objects of his regard.

As it is the first aim of the painter to produce on his canvas some great and striking effect; and by a proper arrangement of parts, to form a beautiful, and consistent whole; so it is the business of every man in the conduct of life, to exhibit to the world a great and consistent character.

ter. In order to accomplish this end, it is necessary to keep one grand object in view, and never suffer ourselves to be drawn from it by too minute an attention to less important parts; for though these may be in themselves commendable, yet, if the principal object has been neglected, in order to bestow more assiduity on these inferior parts, it betrays a deficiency in judgment and true taste, which it will be impossible any other merit can fully compensate.

It is however much to be apprehended, that many persons have passed through the world, not only without discovering, but without once reflecting on the proper objects of their pursuit; and the number is not less, perhaps, of those who, having formed clear and determinate ideas of their duty, have in the course of their conduct lost sight of them; and suffered those things which required their immediate exertions totally to supersede the higher ends, to which they ought only to have been auxiliary.

In general life, what is more common than to suffer the laudable desire of acquiring independence to degenerate into an eagerness for accumulating riches, without a reference to any further end. But can we avoid pitying the man who employs his time in gilding the frame, when he should be finishing the picture?

In the pursuits of science, this error continually occurs; we suffer some particular study, which,

perhaps, accident rather than choice first suggested, to claim the continual sacrifice of our time, and the full exertion of our talents; whilst subjects remain neglected of far more importance, and, perhaps, in fact more suited to our tempers and abilities.

The difficulty of divesting ourselves of particulars, and looking on things in a general view, will, however, decrease in proportion as we habituate ourselves to such employment; and it is rather for the purpose of illustrating the propriety of the practice, than with the expectation of facilitating it, that I beg the attention of this respectable Society, whilst I enter more fully into the subject.

Man, in his original constitution, is endowed with a variety of faculties, different in their ends and nature; but, I conceive, they may be reduced to the three following, viz. the moral sense, or that which distinguishes virtue and vice; the rational faculty, distinguishing truth and falsehood; and the sentimental faculty, or, as it is usually called, taste, which distinguishes beauty from deformity. To the acquisitions made in improving the rational and moral powers we give the name of Science; whilst the sentimental faculty is the foundation of the pleasures we receive from the study of the polite arts.

As these faculties may be improved by exercise, so they may be injured, and decay by neglect,

left, and become totally inapplicable to any good and useful purpose : and it is therefore the duty of every rational being, to make this improvement the first object of his attainment. But in doing this, we should first inquire by what means we may best answer this good end ; for as these original endowments can only be cultivated by means of the sciences and arts, and as these are much diversified in themselves, disclose to us different views, and lead to different ends ; it becomes a business of much importance to inquire what particular branch of science, or of art is most deserving of our attention, before we suffer ourselves to be attracted by such other less important, though not useless, investigations, as may accidentally come across our way.

Now it may certainly be taken for granted, that as beings accountable for our moral conduct, and influencing by that conduct, not only our own happiness, but, in a great degree, the happiness of others, those studies which have an immediate reference to the moral duties of life are of the first importance.

The study of the works of nature may next be allowed to engage our attention—a study, on the knowledge of which depend many of the conveniences and pleasures of life ; and which has, perhaps, a still higher claim to our notice, as inducing us to form to ourselves proper ideas of the attributes and perfections of the great

Creator; who has opened before us his extensive volume, and endowed us with abilities to judge of, and taste to enjoy the beauties it affords.

Science, then, is either moral, or natural; the first, immediately connected with the conduct of human life; the second, more remotely so through the medium of the works of nature: with respect to the former, as it is the indispensable duty of every man to be as fully acquainted with it as his abilities and situation will permit, so it is disgraceful and dangerous to neglect it; whilst the latter, though honourable and useful in the acquisition, may be postponed, or omitted, till a proficiency be made in more important studies.

Notwithstanding this, it has been observed of late, and experience seems to justify the observation, that the present age is more attached to the study of natural philosophy, than to that of morals: which may possibly arise from an idea, that the latter affords but a small scope for the exercise of the mind, and consists chiefly of propositions either self evident, or capable of a simple and decided demonstration. Admitting for a moment this to be the case; yet it by no means precludes the necessity of transferring to our own use, the result of other men's labours; which can only be done by a diligent application to the same studies and pursuits. It is not whether the science be known, but whether I know it, about which I ought to be solicitous.

It



It will however appear, upon a nearer view, that the science of morals affords a much wider field than may at first sight be imagined. The great variety of circumstances and combinations which arise in a polished and commercial state, open, to an accurate observer, a perpetual source of speculation. It is, however, my province to sketch the outline only; to fill it up, properly, would require higher abilities, and more accurate research.

The duties of life are immediately derived from the different relations in which mankind are placed. As a simple, existing being, detached from any other of his species, there is a connection between man and his Creator, which subjects him to certain duties, prior in point of obligation, to every other claim.

As individuals, connected with other individuals, all entitled to the same rights as ourselves; as members of the particular state from which we derive protection; and from the other social and domestic relations of life, many duties are incumbent on us, which require no small degree of accuracy, care and attention, to perform in such a manner, as to merit the approbation of those with whom we are connected, and of our own minds.

Nor let it be thought beneath the dignity of the philosopher, to examine the laws that subsist between man and the inferior animals of the

creation ; a subject, yet, but slightly touched on, though, highly deserving of further inquiry. That acts of injustice may be, and too frequently are exercised upon them, cannot be doubted ; and if so, the necessity of some regulations, in this respect, is the immediate consequence of such concession. A right of property, according to the present system of things, includes also a right to torment, to mutilate, and to kill ; to weary out nature by repeated sufferings ; or to destroy at once that vital spark, the immediate gift of the Divinity, which, when once extinguished, no human power can restore : but, it is to be hoped, this may not arise so much from a ferocity and wanton propensity to cruelty in the human mind, as from a too prevalent idea, that there are no mutual rights between man and the brute creation ; absolute property being vested in the one, and unlimited resignation the lot of the other. To counteract this false and injurious opinion, neither moral injunctions, nor political regulations should be wanting ; nor can the powers of the mind be more honourably exerted, than in preventing the unnecessary extension of actual pain in the universe ; or in pleading the cause of that class of beings, to whom nature, though she gave capacity of pain, denied the power of remonstrating against their sufferings.

These

These then are of all others the studies

*Quæ magis ad nos  
Pertinent et nescire malum est.*

On the cultivation of these depends not only our present, but our future welfare; and shall we, with the ill-timed application of the pretended philosopher, persist in the solution of a mathematical problem, whilst the house burns around us; or suffer shells and feathers to attract our notice, whilst our happiness and our misery hang yet in the balance, and it remains in the power of our utmost exertion to throw an atom into the scale?

Impressed with the idea that these studies are of the first importance to us, and conscious that we are not uninformed with respect to them; it may then be allowed us, to engage in the acquisition of other branches of science, which unite with the gratification of an innocent and natural passion, the expectation of being enabled to render our employment of essential service to the happiness of mankind.

To these studies we may give the name of Natural Philosophy, though, perhaps, in a more general acceptation than that in which it has been, of late, understood: but I am not aware of any impropriety in the use of this term, applied to the study of the whole system of nature; as well intellectual as material. The faculties of  
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the human mind are as much a part of that system, as the form of our bodies, and seem therefore equally to be included under the study of natural philosophy.

In pursuing the subject, it will, however, be necessary to advert to the different channels, into which this great branch of science is divided. These are, first, the knowledge of intellect, called metaphysics; secondly, the knowledge of the extent and quantity of substances, called mathematics; and thirdly, the knowledge of particular properties of substances, usually called physics.

“The mind of man,” says a late excellent writer, “is the noblest work of God which nature discovers to us, and therefore on account of its dignity deserves our study.” That this is the primary, and most important branch of natural philosophy, must be evident to any one who considers that, before we apply ourselves to acquire extraneous knowledge, we ought to ascertain what particular kind our faculties are adapted to attain; and having seen what is, and what is not, in our power, we may then be enabled to pursue such subjects as are within our reach; and not imprudently lavish our time on those which come not within the scope of the faculties with which we are endowed.

The science of mathematics is conversant with the extent, and quantity of substances; and teaches the unchangeable and universal properties

perties of visible objects. It therefore precedes the study of physics, whose province it is to inquire into the particular nature and laws of such objects. If the pleasures received from scientific pursuits depend on the investigation and acquisition of truth, the study of the mathematics is of all others the most capable of affording enjoyment; its conclusions not depending on the subtilty of argument, or the fallacy of language, but being capable either of sensible demonstration, or immediately referring to the first principles of human reason. It may also be added, that this science seems more complete and perfect than any other, as it generally attains the full end it aims at; whereas, in all other sciences we expect to improve, rather than to perfect knowledge.

Under the comprehensive denomination of physics are included many particular studies, each of which affords ample materials for investigation. The professed subject of its inquiry is the whole system of material nature: in the pursuit of which branch of learning it seems proper, in the first place to acquire a general knowledge of the universe, as far as it is discoverable either by our natural endowments, or the artificial assistance with which human invention has supplied us; and from thence to proceed, in our inquiries, through the animal, vegetable, and mineral kingdoms; which employment, as it includes all

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we know of the earth we inhabit, has acquired the name of natural history.

It is by no means my intention to enter into a detail of the several studies which properly arrange themselves under these different heads: it is sufficient to have indicated the pre-eminence and subordination which seem to subsist between the different objects of science, and to have shewn the necessity of adopting similar distinctions.

It must however be remarked, that it is not perhaps in our power to pursue the sciences in the precise order here pointed out; for there is a connection throughout the whole system of human knowledge, which renders it impossible to arrive at excellence in any one branch, whilst we remain totally ignorant of the rest. The tendency of natural philosophy to promote the interests of morality, has already been hinted at; and the science of mathematics is in like manner intimately connected with other branches of natural philosophy.

I must also remark, that though under the general heads before mentioned, I mean to comprehend all human science; yet they by no means include every literary attainment, in the pursuit of which mankind are busied; many of which are acquired only for the purpose of being again employed in the attainment of further knowledge. But, as a skilful artificer before he commences an important work, will bestow great attention

attention in providing the implements necessary for his purpose; so it will behove us to be diligent in attaining these preliminary endowments, without which our labours may either be partially frustrated, or may entirely fail of success.

Of real knowledge there are two sources, solitary observation or inquiry; and information derived from the previous knowledge of others; which last is by far the most copious of the two; but as this can only be communicated by the aid of language, either oral or written, so the certainty of the ideas we thus acquire, will depend on the skill we have attained in that language, by means of which the information is conveyed.

Thus the acquisition of different languages becomes necessary; but in this, as in other instances, care must be taken that we mistake not the means for the end; and whilst we are employed in preparing further materials, suffer not so much of the building as we have already erected to fall to decay. To exert ourselves in attaining a knowledge of language, for the purpose of employing that knowledge in higher pursuits, is truly laudable; but to be conversant only with words, and suffer the science to center in itself, is absurd and improvident.

It is unnecessary to enter into an inquiry, how far translations may supply the deficiencies of classical learning; or to point out the many advantages of which such learning is productive; this

this having been already done, by an author\* to whom the public are under many important obligations. On the result of his "Inquiry into the usefulness of Classical Learning," I shall take it for granted, that a knowledge of the ancient languages is of great advantage in many departments of science; from the exercise of the mind in the abstruser parts of grammatical study, it acquires a facility, and accuracy of distinction which no other occupation can bestow; and by a proper selection of authors we may advance our real knowledge in any particular science, whilst we are procuring the means of applying ourselves with advantage to further studies.

If language be considered as an implement for the purpose of attaining, or improving knowledge, logic is that art which teaches us how to make a right use of such implement; whilst philology, or the science of criticism, maintains the purity of language, and guards it against those innovations which inattention fashion and habit, are too apt to introduce.

These studies, if they come not properly under the denomination of science, are essential to the due prosecution of it. Whilst they support their dignity, we may rest satisfied that true knowledge maintains its ground; but when these begin to be neglected, there is the greatest reason

\* Beattie.



to believe that ignorance and barbarism are again aiming to establish their ancient empire, and to fear that their endeavours are not without success.

It has been before observed, that the pleasures we receive from the fine arts depend on an original or instinctive power of the mind, which I have chosen to call the sentimental faculty: meaning to infer, that, as the improvements we make in virtue and knowledge, are founded on the moral and rational powers, so the acquisitions we make in the arts, consist in the improvement of certain feelings intimately connected by some secret and inexplicable union with the effects of those arts.

Whether the improvement of this faculty be, like that of our other endowments, a duty incumbent on us; and if so, whether that duty ought to have a preference to any, and which, of those particular occupations we have before noticed; and again, which of those arts, employed in the cultivation of our feelings, is most powerful and efficacious in that respect, and ought more particularly to claim our regard, are questions which might admit of long inquiry, but which I shall touch upon as briefly as possible.

The arts now alluded to, are those of poetry, music, and painting, or as they are called, in distinction from manual ingenuity, the polite arts.

Although

Although these arts seem on the first view to be contributory only to our gratification; yet it should seem that Providence, in endowing us with propensities and abilities to investigate and improve them, meant that they should become, in some degree, the objects of our inquiry: and indeed we see throughout the whole creation, that the ends of beauty, amusement, and pleasure have never been neglected; otherwise we might ask, in the language of Shenstone,

- “ Why knows the nightingale to sing?
- “ Why flows the pine’s nectareous juice?
- “ Why shines with paint, the linnet’s wing? •
- “ For sustenance alone? For use?
- “ For preservation? Every sphere
- “ Shall bid fair pleasure’s rightful claim appear.
- “ And sure there seem of human kind,
- “ Some born to shun the solemn strife;
- “ Some for amusive tasks design’d
- “ To sooth the certain ills of life,
- “ Grace its lone paths with many a blushing rose,
- “ New founts of bliss disclose,
- “ Call forth refreshing shades, and decorate repose.”

The cultivation of the polite arts seems then to be conducive to the happiness of man, and consistent with the true end of his nature: but there is a still higher purpose to which they should be applied, the consideration of which will tend to ascertain the rank they ought to hold, and to determine their relative claims upon our time and abilities.

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In admitting that the arts are intended for our gratification, it must not be understood that utility is exclusively the end of science, and amusement the end of the arts. From the study of the sciences, the understanding is enlarged, and the faculties strengthened; from that of the arts, the affections are exercised and the heart is improved.

It would be superfluous, before the present audience, to enter into an explanation of this sentiment; for who has not experienced that delightful glow, that inexpressible sensation, favourable to virtue and humanity, which the labours of the genuine poet never fail to inspire? Who has not felt himself roused to action, or excited to pity, or affected with social sorrow, by the powerful effects of harmony, or the vivid representations of the pencil? After being conversant with these arts, the mind feels itself soothed and softened, and is then capable of receiving more distinctly and deeply, and retaining to more effectual purpose, those finer impressions, whence a very considerable share of human happiness is derived, and which either give rise to, or highly improve, all the charities of social life.

Let us not then conclude, that, because the fine arts are apparently calculated for the gratification of our feelings, therefore they are to be postponed to all the more serious avocations which have before been noticed. It is their pro-

vince to act upon our affections and passions, the impulses of which have often as principal a share in the direction of our conduct, as the suggestions of our judgment ; and to regulate, correct, and harmonize them, by those means which Providence has afforded us, becomes therefore a part of our duty no less essential, than the improvement of many of the sciences, or the cultivation of our rational powers.

To ascertain the particular rank to which the arts are entitled, might perhaps be a matter of some difficulty. That they ought by no means to interfere with the attainment of moral science is certain ; and perhaps several branches of natural philosophy, closely connected with the utility of mankind, may have a stronger claim on our time and abilities ; but that they are invariably to be postponed to the study of nature, in all its branches cannot be allowed. From the contemplation of heroic actions, whether communicated by the pen or the pencil, feelings are incited, strongly connected with the first and leading object of our pursuit, and of great importance to the advancement of virtue and the improvement of human life.

I must also remark, that as an unvaried application to one pursuit, is not only irksome to us, but frequently defeats the end it aims at, those occupations, by whose assistance the mind can relax without debilitating, and amuse with-  
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out degrading itself, must ever stand high in our estimation; and by being intermingled with our more serious labours, will afford a degree of cheerfulness, vigour, and activity which will tend more than any other means to insure success in higher pursuits.

Of an endeavour to fix the comparative excellence of the polite arts with each other, the result would be of little use, nor is the subject susceptible of novelty. There is no great difficulty in influencing the judgment to the pursuit of any particular study; but the sentimental faculty chooses its own objects, and seldom makes a proficiency in any branch of art which it has not spontaneously adopted.

I have thus made a faint attempt to elucidate an idea, which I conceived to be of considerable importance; and though I pretend not to have balanced with an accurate hand the comparative merit of the sciences, it is enough for my purpose, if I induce others to reflect, that there is a very considerable difference in the degree of attention that ought to be paid to them. And it will, I hope, sufficiently appear, that the cultivation of the moral sense ought to be the grand object of our endeavours, and that even the improvement of our intellect is laudable, principally, as it promotes this great end.

Let it however be permitted me to remark, that throughout this essay, I have considered

every individual of mankind as engaged to improve his abilities, and thereby promote his own happiness to the utmost of his power : but that I by no means would be thought to detract from the characters of those men, who have employed their time and talents in the pursuit of particular sciences, even to the exclusion of others ; and by arriving at eminence in them, have extended the bounds of human knowledge, and smoothed the way for future travellers. Infinite are the obligations mankind are under to the illustrious characters who have thus devoted themselves to the public good : but we may reasonably expect to stand excused, if, whilst we enjoy the fruits of such generous ardour, we aim at the security of our private happiness, and prefer the secret consciousness of a proper discharge of the duties of life, to the popular approbation, which deservedly waits upon those who have successfully exerted their abilities, on subjects which have little or no connection with the promotion of virtue, and the advancement of moral rectitude.

*On the CRETINS of the VALLAIS; by Sir RICHARD  
CLAYTON, Bart.*

READ MAY 9, 1787.

**M**ANKIND has been divided by Linnæus into four separate classes, to each of which he has assigned some characteristic difference in point of disposition. The European and American, the African and Asiatic receive, regularly, it should seem according to his system, an impression from the climate, which adheres to them through life, unless it have been weakened or overpowered by their having left their native country in very early infancy\*. Other naturalists have remarked a like degree of its influence in the formation and disposition of animals in general, and its empire has been extended by some, even to the vegetable world†. The observation is indeed an old one. Hippocrates has a long chapter‡ in which he treats of the air, water, and particular situations, and

\* Buffon. Hist. Naturelle. De Generation des Animaux.

† Wilson on the Influence of Climate on Vegetable and Animal Bodies.

‡ Sect. III. p. 280. Editio Foesii.

he there traces their supposed effects on the structure and passions of mankind. Though venerable from its age, the opinion has been lately controverted, and ridicule has been called in to attack those positions, against which more solid reason appeared to have exhausted all her powers. But, whatever may be the doubts of modern sceptics, or the problems of new philosophers, no arguments can be brought up against visible demonstration. To those who deny the effects of local causes, and the influence of particular climates and situations, may be opposed only the Cretins of the Pays de Vallais; a set of beings, above indeed the brute species, but in every respect below their own. Without a previous acquaintance with their real origin, the stranger might be tempted to consider them as a distinct, inferior part of the creation, and the intermediate link betwixt man, and his disfigured image, the Ouran-Outang. The description Linnæus has given us of this animal may be applied to the Cretin, with a few exceptions; and that of the French Pliny, as the Comte de Buffon has been called, is marked with a resemblance still more striking. The district these beings are comprised in, is part of the lower Vallais, and takes in about thirty miles in length, and eight in breadth. Round Sion they are very numerous, but they are most so between the bridges of St. Maurice and Rîde.

A few



A few of them are to be found on each side, and at each extremity, but they then gradually disappear. Cast in the same mould with the rest of mankind, they have, most certainly, its form; but one looks in vain for

“The human face divine,”

illuminated with sensibility, and lighted up with the ray of understanding. Physiognomists have pretended to discover a trait of the inward character, written on almost every countenance, that bespeaks the passions each individual is warmed with. One proof may at least be added to their system, without adopting it in its fullest extent; for, with the Cretin, the vacuum is distinctly visible. Every mental faculty appears benumbed, and the dreadful torpor is unequivocally expressed. It must be admitted, however, that there are distinctions in the scale of sense, and different gradations amongst them, from total darkness to intellectual twilight, and the dim dawn of understanding. Some have a sort of voice, but the deaf and dumb are very numerous; and there are multitudes who are even mere animal machines, and devoid of almost every sensation. In point of stature, four feet and a half is the standard they reach in general, and it is seldom exceeded more than a few inches. Their countenances are pale, wan, and livid; and, exclusive of other external marks of

inter-marriages with families whose ancestors had unfortunately a share in the calamity. The reverse of the proposition, I have been lately informed from very respectable authority, holds equally true; and that Cretin colonies removing from the district, and marrying only amongst themselves, after one generation, or at most two, lose the disgusting distinction they carried with them. Long as the subject of this paper has existed, it is astonishing nothing has been systematically written on it. A memoir was indeed read, some years ago, to the Royal Society at Lyons, but as I do not find it was ever published, the members only became acquainted with the opinions, its author, the Comte de Maugiron, entertained. Government has at last begun to interest itself, and has recommended some precautions to be taken, by which, it is hoped, the number of the Cretins will diminish. Many of the most deplorable are now secluded from society, and maintained with great care in the hospital at Sion; and their marriages with each other, which were formerly permitted in order to prevent other inconveniences, and by which they were propagated *ad infinitum*, are not at present allowed of. The early management of the children is also particularly attended to, and minutely watched; and on the least suspicion of a tendency towards Cretinage, they are sent into the distant mountains to be nursed. Whether any of these precautions,

precautions, or all of them united, will be followed with the consequences devoutly to be wished, time, the great touch-stone of all experiments, can alone decide.

In the several descriptions of Switzerland and the Vallais, the subject has been sometimes casually glanced at. Some brittle, hazardous ideas have been thrown out at random, but in general, it has been left in the state in which it has been found, and the circumstance has been barely mentioned, without any endeavours to point out its origin and cause. I have no claim to any greater share of wisdom, and do not pretend, by any means, to superior sagacity or penetration.

I lay little stress on the influence of the imagination of the mother on the foetus, which has been the theory of some. Without entering into the question, how, or in what manner, such an impression is communicated, I shall observe only, it is an opinion which appears to be giving way daily; and that even its warmest partisans admit only of its existence in very few instances, and under very limited restrictions. The Cretins are too numerous to allow of such a partial cause; and as what is perpetually before the eye soon ceases to be matter either of astonishment or terror, their very numbers would counteract any effect they might otherwise occasion. Their country women, born and bred up amongst them, consider them only as every other production  
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of their country, and in fact, instead of bestowing on them particular notice or regard, they are surprised when a stranger examines them with any scrupulous attention. I should imagine, therefore, we ought to search for some other cause. Of the writers who have touched on the Cretin, some have attributed the misfortune to the supposed cause of the goitres, so very common in many of the Swiss peasants, the water they drink being impregnated with snow, tufa, and some mineral substances washed down with it from the neighbouring mountains. That the Cretins are subject to the goitre, must be acknowledged; but it should at the same time be remarked, as it is common to the rest of the inhabitants, its cause, whatever it may be, can hardly be supposed to be that of Cretinage. The peasants of the Alps, of Tirol, and many other parts of Switzerland drink water of nearly the same quality, and have the goitre; but the Cretins are confined to the district I have mentioned, and if they occur in other places, it is merely from a removal with their parents. This hypothesis appears therefore to have been taken up, likewise, without solid foundation, and the fabric raised upon it has been built on a scale too narrow and confined. The air has been, by others, supposed to be the sole cause of the disaster. Throughout the whole country they are found in, it is most certainly unwholesome. They reside,  
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in fact, in a sort of vast Basin, full of excessive exhalations from the Rhone, and the marshes on its sides; and the reflection of the sun from the surrounding mountains, which are almost vertical, forms an atmosphere very singular for its humidity and heat.

At Sion in particular; the houses are often steeped up to the second story, in a thick, hot, and glutinous vapour; and the body, during the summer months, is in a very uncommon state of perpetual perspiration. This naturally occasions a lassitude and indolence, which unstring the human frame; and along with them, one meets with their usual attendants, excessive poverty and filth. Their joint effects on the human body, it would be useless to dispute; but how they can curtail the stature, and coagulate the understanding, to such a wonderful degree, is difficult to ascertain. Whether any light may be derived from the dissection of a Cretin, is an experiment that has not yet been made. To be of any use, however, it should not be confined to a single subject, but should be extended to every variety, from the moment the malady has made its first appearance, to the time it has arrived at its full maturity of weakness. Some attempts for this purpose I understood had failed, and they will be yet attended with difficulty, and some little danger. Philip of Macedon's golden key will not here unlock the grave;

grave ; and a violation of the rights of sepulture would be still considered as the first of crimes.

Little can be gleaned up, I am apprehensive, from the history of the human species, relative to the question ; but amidst its varieties, we find the Dondos, or African white negroes ; the Kakerlaks, or Chacrelas of Asia ; and the Blafard, or White Indian of the Isthmus of Darien ; all of whom have some peculiarities corresponding with those by which the Cretin is distinguished. The Dondos are most common at Congo, Loango, and Angola, and the Kakerlaks, or Chacrelas, in the Java islands ; but as they are not very numerous, they have been considered as a *Lusus Naturæ*, and her accidental productions\*. Of the white Indians of Darien little was known in Europe before 1680, though Cortez† had given a long and minute description

\* It is remarkable, however, this *Lusus Naturæ* in the Java islands has been extended even to the monkey. The governor of Batavia had one or two white ones in 1785, brought from those islands, though they are in all that part of the world universally black or brown. Mynheer Butterkoper, and Mynheer Messa the Water-Fiscal, shewed them to a friend of mine. The face was of a milky white, the eyes red, and they were between two and three feet high.

† Las Cartas de Don. Hernando Cortez de la Conquista de Mexico al Emperador. They have been translated into Latin, and are in the collection of Hervagius, un-

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tion of them in his letters to Charles V. The stature of the Dondos, the Kakerlak, and White Indian is nearly that of the Cretin of the Pays de Vallais, and their whole appearance announces excessive debility and weakness. Their similitude, in many other respects, seems to give some weight to the supposition of a like deficiency in their formation. The weakness of the eye, they are all in some degree subject to; deafness in one degree or other is peculiar to them; they all die early; and they have all the same scanty portion of intelligence.

Much has been written\* on the blackness of the negro, and for some time, like the atoms of Epicurus, one system regularly confuted another. Whatever the derangement which produces the variety in the negro may be owing to, it may possibly bear some relation to that which occasions an alteration, nearly as violent, in the human species of the Vallais. Mr. Michel, a

der the title F. Cortesii de Insulis nuper repertis Narratio ad Carolum Quintum. For an account of the white Indian see Buffon, *Hist. Naturelle de l'Homme*. Dampier's *Voyages*, vol. IV. p. 252, and *Melange de Literature*, tom. I. where Voltaire has given a very minute description of the white Indian brought to Paris in 1744.

\* See Sanctorinus, Malpighi, Albinus, Ruysch, Haller, Winslow and Heister. Town's Letter to the Royal Society. *Hist. de l'Academie de Sciences*. 1702. Dissertation de Monsr. Barrere. *Traité de Monsr. le Cat*. Zimmerman *Geograph. Zoolog. & Memoires de l'Academie de Berlin*.

name

name of some eminence at Berlin, for anatomical inquiries, has remarked in one of his letters, " Vous observez la \* couleur de sperme est différente de celui des Hommes blancs. Vous attribuez, au Changement de ce sperme, leur metamorphose de noir en blanc ; si l' on ajoute à cela, la couleur différente de leur Cerveau, de leur Sang, et de la liqueur qui forme leur Epiderme, on verra que l' effet qui blanchit les Negres est fondé dans un changement des humeurs les plus essentielles de corps."

Taking the position for granted, how this essential alteration has been brought about will be still matter for physical discussion. Air, water, aliment, indolence and filth may be powerful causes, and they become undoubtedly more forcible when combined, and when they have acquired increased strength from their continued operation for a long course of years, on successive generations. The air is most avowedly insalubrious on the whole isthmus of Darien, and what appears decisive, as to its influence, is the known fact, that the female negroes brought from

\* If this be an error, it is an error at least of long duration. Herodotus has advanced boldly : *η γοητὴ δὲ αὐτῶν τὴν ἀπιδενταὶ εἰς τὰς γυναικὰς ὃ κατὰπερ τῶν ἀλλῶν ἀνδρῶνται· ἐστὶ λευκὴ, ἀλλὰ μελαινα κατὰπερ τὸ χροῖμα· τοὶ αὐτὴν δὲ καὶ Αἰθιοπεὶς ἀπιδενταὶ θορῆν*. Thalia. 240. Ed. Wessel. It is but fair however to add that Aristotle denies this expressly. Hist. Animal. lib. III. C. 27. *περὶ σπερματῶ*; and also Gener. Animal. lib. II. C. 2. *περὶ τῆς τῷ σπερματῶ φύσεως*.

Africa



Africa to Carthageria and Panama, where the climate is to the last degree inhospitable, and the perspiration of the body astonishing, produce more of the white Indians than in any other part of the new continent.

The same causes regularly subsisting, it may be asked why they are not attended uniformly with the same effects. To resolve the difficulty, may it not be questioned, whether the humours of certain persons are not in some secret, unknown state, which facilitates the metamorphosis.

To those whose studies lead them to investigate the human frame, with its disorders, the subject is not altogether an uninteresting one. We owe much to the labours of great and learned men during the last century; but, notwithstanding the rapid advances they have made in every part of science, much remains to be yet done. A wide field is still open for researches into human nature, and posterity may, perhaps, discover what we have in vain attempted to explore.

*A DESCRIPTION of the EYE of the SEAL; by Mr.  
HEY, of LEEDS.*

READ OCTOBER 26, 1787.

**I**N the debate concerning the immediate organ of vision, it has been asserted, and is taken for granted by the best authors, that the eyes of the seal and porcupine are differently formed from those of other animals; having the optic nerve inserted in the axis of the pupil. This difference of structure has been urged as an argument to prove, that the retina is that part of the eye which receives the picture, and conveys to us the idea of external objects. For since, according to the laws of optics, the picture must be formed in and about the axis of the pupil; and since the choroides is wanting at the insertion of the optic nerve, the choroid coat cannot, in these animals, receive the complete picture of any object.

Though the argument fails with respect to the animal whose eye I am about to describe, yet I do not mean to express any doubt that the retina is the proper organ of vision. The preceding observation is mentioned as that which excited my curiosity to know, whether this deviation

viation from the ordinary course of nature was a matter of fact. I procured two eyes of a seal, caught in the north seas, and which were preserved for my use in rum; and examined them both by dissection. The following short account of the peculiarities in the eye of this animal, may not be unacceptable to the Literary and Philosophical Society.

The form of the eye, when deprived of the adipose membrane and muscles (in which state I received it) was quite globular, measuring three inches and three quarters in circumference.

The sclerotis was rather thinner than that of a sheep; but diminished gradually, as is usual, from the posterior part of the eye, to its junction with the ciliary ligament. From the great breadth of the ciliary ligament, which measured a quarter of an inch, the thinnest part of the sclerotis was not contiguous to the cornea, as in the human and sheep's eye, but surrounded the middle of the eye. So that the outer membrane, or coat, grew first gradually thinner, to the middle of the eye, and then became suddenly thick, continuing so to its junction with the cornea.

The cornea was horizontally oblong, the vertical diameter being about  $\cdot 75$  of an inch, while the horizontal was  $\cdot 85$ ; so that the horizontal diameter exceeded the vertical by one-tenth of an inch.

The choroid coat adhered very firmly to the sclerotis. It was black on its posterior surface, but grey on its anterior.

The iris was black on both its surfaces, and was evidently a continuation of the choroides. The pupil was remarkably small, forming an aperture no larger than might be made by the puncture of a middle-sized pin. The figure of the pupil, before the iris had been touched, was that of an equilateral triangle.

The crystalline humour was nearly spherical; if there were any deviation from a sphere, it was by approaching to the figure of an oblate spheroid. The ciliary processes were attached to the equatorial part of the crystalline humour, if I may be allowed the expression.

At first sight, the optic nerve seemed to be inserted in the axis of the pupil; but, upon making a longitudinal incision through the nerve, quite down to the retina, I found that its insertion was on the inner side of that axis, as in other animals. The substance which surrounded the optic nerve was fibrous, and, spreading itself out every way as it approached the sclerotis, was continued into the substance of that coat. Indeed, the sclerotis seemed to be formed by the fibrous substance which accompanied the optic nerve; only, after this substance had diverged a little way from the nerve, it became compact, as the sclerotic coat usually is. The optic nerve was  
somewhat

somewhat enlarged as it passed through the sclerotic, and was again contracted in its passage through the choroides. In the former part, the diameter of the nerve was  $\cdot 08$  of an inch; in the latter  $\cdot 06$ .

Upon measuring carefully the different arcs of of the circumference of the eye, taken from the optic nerve to the center of the pupil, it was found that the nerve was placed at the distance of  $\cdot 11$  of an inch from the axis of the pupil. And as the axis of the pupil must be in the center of that area on which the picture is formed, the diameter of the area on which a picture may be formed in the eye of a seal is  $\cdot 22$ , or nearly a quarter of an inch, of the retina, excluding the breadth of the optic nerve.

The quantity of fibrous substance accompanying the optic nerve in this animal, the spreading out of that substance, with the smallness of the nerve itself, seem to have been the causes of that deception, which some incautious naturalist has fallen into, and which has been propagated by the different authors who have copied one another on this subject.

The smallness of the pupil in this animal is very remarkable. What there is in the habits of a seal to require this structure, I cannot tell. It seems a general law of nature, that the pupil of the eye becomes dilated at death. But unless this law be reversed with respect to the seal, its

eye must admit very little light, though it may allow great distinctness of vision.

In measuring different parts of the eye, I was assisted by Mr. Aspdin, an ingenious watch-maker, in this town.

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OBSERVATIONS *on the* KNOWLEDGE *of the*  
ANCIENTS *respecting* ELECTRICITY; *by*  
WILLIAM FALCONER, M. D. F. R. S.  
*Communicated by Dr. PERCIVAL.*

READ MAY 2, 1788.

IT is, I believe, generally allowed, that Electricity, considered as a principle, or quality, pervading all nature, was unknown to the philosophers of antiquity. It is, however, admitted, that some of its effects were observed by them, but their observations led them to believe, that it was a peculiar property of certain bodies only, and not that it was, as it now appears to be, one of the most general and active agents in the natural system. Theophrastus is, as far as I know, the first writer that has remarked the attractive power of bodies to one another, distinct from the attractions of gravity and magnetism.

netism\*. He speaks in his Treatise on Stones, of  
 “amber dug on the coast of Liguria, which had  
 “an attractive power. He intimates, that the  
 “clearest had this property in the highest de-  
 “gree, and that it would attract iron.” The  
 same writer ascribes similar properties to the  
 lapis lycnurius, which is now believed to be  
 the tourmalin, though it was formerly esteemed  
 to be the same with amber. Theophrastus,  
 however, clearly distinguishes them from one  
 another, though he ascribes the same attractive  
 properties to both. “It possesses†,” he says,  
 “an attractive power like amber; and, as they  
 “say, attracts not only straws, and leaves, but  
 “copper also, and iron, if in small particles.”

Pliny gives a similar account. “Amber‡,”  
 says he, “being rubbed with the fingers, and

\* και γαρ ορυκτον περι λιγυρικην. Και τουτο αν η του ελκειν  
 δυναμις ακολουθοιη μαλιστα δε επιδαλος και φανερωτατη η τον σιδηρον  
 αγουσα. Theophrast. περι λιθων.

The contrary is now thought to be the case, as the  
 cloudy amber is thought to be the most strongly electric  
*per se*. See Dr. Milner on Electricity.

† Ελκει ωσπερ το ηλεκτρον. Οι δε φασιν ε μονον καρφην, και  
 φυλλα, αλλα και χαλκον, και σιδηρον, εαν η λεπτος. Ibidem  
 Theophrasti.

‡ Cæterum attritu digitorum acceptâ, vi caloris attra-  
 hent in se paleas & folia arida, ut magnes lapis ferrum.  
 Plin. lib. XXXVII. cap. 3.

Nec folia autem aut stramenta in se rapere, sed æris aut  
 ferri laminas. Ibidem Plinii.

“ having thereby become warmed, attracts to  
 “ itself straws and dried leaves, in the same man-  
 “ ner as the magnet does iron.” He ascribes  
 the same properties to the lapis lyncurius. Soli-  
 nus\*, Priscian†, and, I believe, many other  
 writers have noticed the same quality of that  
 stone.

But the attractive power which electricity  
 imparts to bodies, is not the only property of  
 that fluid that was known to the ancients.  
 They were acquainted with the effects of the  
 electric shock; and have minutely described the  
 sensations occasioned thereby, upon the human  
 body. I do not however mean to insinuate, that  
 they apprehended any connection to subsist between  
 the attractive power just spoken of, and that  
 which I am about to mention. It is now proved,  
 beyond a doubt, that the benumbing power, which  
 is found in the torpedo, and several other fishes, is,

\* Lapidī istī ad succinum color est pariter spiritu attra-  
 hit propinquantia. Solin. cap. II.

† Paleas rapiunt tractu frondesque caducas. Prisc. in  
 Periegesī.

In Syria quoque foeminas verticillos inde facere & vo-  
 care harpaga, quia folia & paleas vestiumque fimbrias ad se  
 rapiat. Plin. XXXVII. 3.

The word by which amber was known among the Arabs  
 (karabe) is said by Avicenna to be of Persian origin, and  
 to signify its power of attracting straws. Salm. De homo-  
 nym. hyles iatricæ.

in



in reality, produced by the electric stroke, which they have a power of imparting to any object they please, with which they come in contact; and is indeed the method they have both of defending themselves, and providing food. Aristotle says, that the torpedo\* “causes, or “produces a torpidity upon those fishes it is “about to seize, and having by that means got “them into its mouth, feeds upon them.” He adds, “that this fish hides itself in the sand and “mud, and catches those fish that swim over it, “by benumbing them; of which,” he says, “some have been eye-witnesses. The same fish “has also the power of benumbing men.” Pliny says, “that this fish† has the power of “communicating its benumbing quality, if “touched with a spear, or a rod; and is able to “impart a torpor over the strongest muscles of “the body; and, as it were, binds and stops the “feet even of the swiftest persons.” Galen‡

\* ἡ τε νάρκη νάρκην ποιοῦσα ὡν ἀν' ὁρατῆσθαι μέλλη ἰχθύων, τῷ τροπῷ οὐ ἔχει ἐν τῷ σώματι λαμβανούσα, τρέφεται τούτοις. κατὰ-κρυπτεται δὲ εἰς τὴν αἰμαὸν καὶ πηλὸν· λαμβάνει τε τὰ ἐκινεῶντα ὅσα ἀν' νάρκησιν ἐπιφερομένα τῶν ἰχθύων· καὶ τούτου αὐτοπῆαι γέγονται τινες. — ἡ τε νάρκη φανερὰ ἐστὶ, καὶ τοῖς ἀνθρώποις ποιοῦσα νάρκην. Arist. Hist. Anim. L. IX. 37.

† Torpedo etiam procul & e longinquo, vel si hastâ virgâve attingatur, quamvis prævalidos lacertos torpescere facit, & pedes quamlibet ad cursus veloces & alligat & retinet. Plin. XXXII. 1.

‡ Galen de locis affect.

says,

says, “ that the torpedo is endued with such a  
 “ a power, that if it be touched by the fisherman  
 “ with his eel spear, it instantly stupifies the  
 “ hand, transmitting this power through the  
 “ spear, to the hand.” Plutarch\* says, “ that  
 “ it affects the fishermen through the drag-net;  
 “ and, that if any person pours water on a living  
 “ torpedo, the sensation will be conveyed through  
 “ the water to the hand.”

Oppian has gone still farther, and has discovered the organs by which this fish is enabled to produce this extraordinary effect, which he ascribes to “ two† organs of a radiated texture,  
 “ which are fixed, or grow on each side of the  
 “ fish.” Claudian has written a short poem on the torpedo, but he mentions no qualities of it different from those which have been recited above, save that it can convey its influence from the hook, with which it is caught, to the hand of the fisherman. From the above accounts we see, that the philosophers of antiquity had accurately observed the nature of this extraordinary influence, though they knew not to what

\* Plutarch de Solert. Anim.

† Ἀλλὰ οἱ ἐν λαγόνεσσιν ἀναλκμῆος δόλος ἀλκή,  
 Κερκίδες ἐμπεφυασὶ παρὰ πλευρὴν ἐκατέρθεν  
 Ἀμφιδύμοι, τῶν εἰ τις ἐκίψαισι πηλασσάσας,  
 Αὐτίκα οἱ μέλεος σθένος ἐσβίβεν.

Opp. lib. II. ver. 62.

general

general principle it ought to be ascribed. They noticed the sensation, and its effects on the body, the use the fish makes of this property for its defence and support, and that the fish had the power of conveying it through wood, metals, hemp or flax, and even through water; and lastly, that this extraordinary power was lodged in organs peculiar to the fish, a fact which the late accounts of the dissection of the electrical eel farther confirm. It is remarkable, that Pliny ascribes this power of the fish to a certain invisible agency, and calls it by the same name\* that has been applied by later writers to denominate the electrical influence.

It is farther worthy of remark, that the electrical shock, imparted by means of the living torpedo, was used in medicine. Vossius† mentions, from some ancient authority, that an inveterate

\* Quod si necesse habemus fateri, hoc exemplo, esse vim aliquam, quæ odore tantum & quadam *aurâ* sui corporis afficiat membra, quid non de remediorum omnium momenti sperandum est. Plin. XXXII. cap. 1.

† It appears to be from Scribonius Largus.

Capitis dolorem quemvis veterem & intolerabilem protinus tollit & in perpetuum remediat torpedo viva nigra, imposita eo loco qui in dolore est, donec desinat dolor & obstupefcat ea pars, quod quum primum senserit, removeatur remedium, ne sensus auferatur ejus partis. Plures autem parandæ sunt ejus generis torpedines, quia nonnunquam vix ad duas, tresve respondet curatio, id est, torpor quod signum est remediationis. Scrib. Larg. cap. I.

head

head-ach was cured by the application of a living torpedo to the part where the pain was seated. The same remedy was also in use for the gout; the patient\* being directed to place a living torpedo under his feet, as he stood on the sea shore, and to continue it until he found the numbness not only affect the whole of the foot, but the leg also, as far as the knee. This remedy is said to have cured Anthero, a freedman of Tiberius Cæsar.

Dioscorides† advises the same remedy for inveterate pains of the head, and for protrusions of the rectum; and Galen‡ seems to have copied him in recommending the same remedy for such complaints. The same application for the head-ach is to be found in Paulus Ægineta,|| and I believe, several other of the later writers on medicine. An ingenious and learned Gentleman suggested to me, that it was probable, that even the method of drawing down electrical fire from

\* Ad utramlibet podagram, torpedinem nigram, vivam, quum accesserit dolor, subicere pedibus oportet, stantibus in litore, non sicco, sed quod alluit mare, donec sentiat torpere pedem totum & tibiam usque ad genua. Hoc et in præsentī tollit dolorem, & in futurum remediatur: hoc, Anthero Tiberii libertus supra hæreditates remediatus est. Scribon. Larg. cap. XLI.

† Dioscorid. lib. II. Art. Torpedo. Vide edit Matthioli. 1560.

‡ Galen. Simpl. Medic. lib. XI.

|| Pauli Æginet. lib. VII. Art. Næm.

the

the clouds was known in very early times, and particularly to Numa Pompilius, the second king of Rome; and that his successor Tullus Hostilius, perished by his unskilful management of so dangerous a process. Numa Pompilius, we know, was a Sabine, a tract comprehended in the limits of the ancient Etruria, a country from whence the Romans professedly derived most of their religious rites and ceremonies. Diodorus Siculus informs us, that the Tyrrheni or Etrusci, Numa's countrymen, were particularly knowing in every circumstance relative to thunder, as a branch of natural history, which they studied very eagerly: *γραμματὰ τε καὶ φυσιολογίαν ἐξεπώνησαν ἐπὶ πλείστον, καὶ τὰ περὶ τῆς κεραυνόσφοιαν μάστιγα πάντων ἀνδρῶν κινεῖν ἐξείργασαντο.*

Lib. V. p. 219, edit. Rhodomanni.

Pliny speaks to the same purpose. *Extat animalium memoria sacris quibusdam . . . vel cogi fulmina vel impetrari. Vetus fama Hetruriæ est impetratum . . . evocatum & a Porſenâ suo rege.* Numa himself was, undoubtedly, a man of science. He rectified the calendar, and by intercalation brought the lunar and solar years to correspond. He was acquainted with the power of a concave speculum in concentrating the sun's rays, so as to inflame bodies; and it was in this way that the vestal fire was lighted. He instituted religious ceremonies, and formed a college of heralds, and was indeed their principal legislator,

in what regarded religion and the laws of nations. Among other acts, Livy tells us, that he built an altar on the Aventine mount to\* Jupiter Elicius, whom, it was given out, that he had a power of drawing down from heaven, to explain what was portended by prodigies, and particularly by thunder and lightnings, and to advise with him on other important occasions. Arnobius, copying Plutarch, says, that Numa not being acquainted with the means of procuring thunder, which knowledge he was desirous to acquire, applied to the goddess Egeria, who taught him the method of drawing Jupiter down from heaven. Now we know, that in the Jewish religion, the visible appearance of the Deity was in the form of a flame of fire; witness the manifestation to Moses, in two instances, and the Shechinah of the temple. The same idea prevailed in the Pagan mythology; Jupiter, when he was obliged to come to Semele† with the characte-

\* Quæque prodigia fulminibus, aliove quo viso, missa susciperentur atque curarentur: ad ea elicienda ex mentibus divinis, Jovi Elicio aram in Aventino dicavit, deumque consultæ auguriis, quæ suscipienda essent. Livii lib. I.

Eliciunt cælo te Jupiter, unde minores  
Nunc quoque te celebrant Eliciumque vocant.

Ovid. Fastor. lib. III. 327.

† Immistaque fulgura ventis  
Addidit, & tonitrus & inevitabile fulmen.

Ovid. Metamorphos. III. 300.

The few lines above are called *Insignia Jovis*.

rific

ristic signs of his presence, came in this manner; to draw down thunder then, and to draw down the Deity, were, according to this acceptance, the same thing; and this Pliny\* testifies, as he says, from good authority, had been often performed by Numa. Let us now examine the account of the death of Tullus Hostilius. Livy† says of him, “that after examining the Com-  
“mentaries of Numa, and finding there a descrip-  
“tion of certain occult and solemn sacrifices,  
“performed to Jupiter Elicius, he set himself to  
“execute these in private; but from some impro-  
“priety in the commencement and conduct of  
“these operations, he not only failed of being  
“favoured with any intercourse with any celest-  
“tial beings, but was, through the wrath of  
“Jove, excited by his being importuned with  
“such irregular rites and ceremonials, struck  
“with lightning, and consumed, together with  
“his palace.”

\* Et ante cum a Numâ sæpius hoc factitatum, in primo annalium suorum tradidit L. Piso gravis auctor. Plin. II. 53.

† Ipsum regem tradunt, volentem commentarios Numæ, quum ibi quædam occulta solennia sacrificia Jovi Elicio facta invenisset, operatum his sacris se abdidisse; sed non recte enitum aut curatum id sacrum esse; nec solum nullam ei oblatam cælestium speciem, sed irâ Jovis, sollicitati prava religione, fulmine ictum cum domo conflasse. Livii. lib. I. cap. 31.

Pliny's

Pliny's \* account agrees herewith. He says, that Tullus Hostilius, " whilst he was imitating " in an irregular and improper manner, the pro- " cesses of Numa, for drawing down lightning, " was struck with a thunderbolt."

Dionysius Halicarnassensis † agrees, that he perished by fire, together with his family; but though he says, that many thought the burning of the palace was an artifice, to conceal the murder of the king and his family, yet himself inclines rather to the opinion that he died by lightning, on account of his improper conduct respecting the sacred rites. All agree that he perished in a storm, and during the performance of a private religious ceremony. Considering the intent of these rites, which were probably composed of some processes, which exhibited appearances of an electrical nature, it is, I think, at least probable, that he really lost his life by his unskilful management.

There is a remarkable passage in Lucan, relative to this subject. Arruns, a learned Etrurian, whom he had before described as skilled in the motions of lightning ‡, is said, by him, to have " collected the fires of lightning that were dis-

\* Quod (scilicet fulminis evocationem) imitatum parum rite Tullum Hostilium ictum fulmine. Plin. lib. II. cap. 53.

† Dionys. Halicarn. p. 176, edit. Sylburgii.

‡ fulminis edoctus motus. Lucan.

" perfed



perfed through the fky, and to have buried them\* in the earth. “What is this, but the description “of the ufe of a conductor, to fecure buildings “from being ftruck by lightning?”

Let us now fee if any probable conjecture may be formed, concerning the means or instruments which they employed in thefe operations. We know that the Hetrufcans and Sabines, Numa’s countrymen, worfhipped † fpears, and were, indeed, the inventors of thofe weapons. It is probable that they might not worfhip, or employ one fpear only in fuch folemnities, but a number, perhaps a large cafe, or what Homer calls Δρυοδραν†, or a kind of foreft of fpears. The firft places of worfhip were in the open air, the word *templum* § originally fignifying the heaven, or fky. Befides, they were upon high places. The Law was delivered to Mofes upon mount Sinai: and high places are mentioned often || in the fcriptures as

\* Arruns difperfos fulminis ignes

Colligit, & terra mæſto cum murmure condit.

Lucan. Phars. I. 606, 607.

† Sive quod hafta quiris priſcis eſt dicta Sabinis,  
Bellicus a telo venit in aſtra Deus.

Ovid Faſt. II. 477.

‡ Odyſſ. I. 128.

§ Templum cælum dictum eſt quia ipſum primò tæmur. Stephan. Theſaur.

|| Levit. xxvi. 30. Numbers xxii. 41.—xxxiii. 52.  
1 Kings iii. 2, 3.—xii. 31, 32.—xiii. 2, 32, 33.—xv. 14.  
& fere paſſim.

the feats of idolatrous worship. Now, were a forest of spears, with the points upwards, and with the handles of dry wood, or, perhaps, some of the Teribinthinate kind, which are bad conductors, and placed upon an elevated situation, they might, if placed within striking distance, exhibit a luminous appearance, and in certain seasons collect electrical fire, sufficient to make a great discharge; and, as I suppose, to destroy any person within the reach of their influence. This is not altogether matter of conjecture. Plutarch says, that balls of fire were seen to rest on the points of the soldiers' spears, and we know, that in our own times, in the Mediterranean sea, it is common for balls of fire to rest on the rigging of the ships, which appearances were formerly called by the names of Castor and Pollux; and in later times, the fires of St. Helmo, and are thought to foretel good weather. Was it from this opinion, that St. Paul's ship, mentioned in the Acts of the Apostles, had the images of Castor and Pollux on its prow. Livy\* speaks of a spear, in a house, that burned more than two hours, yet without being consumed. Could this be any thing but electrical?

It should be observed, that Numa did not build a temple, but an altar, in the open air, to

\* Fregellis in domo L. Atrei haeta, quam filio militi emerat, interdiu plus duas horas arsisse, ita ut nihil ejus ambureret ignis, dicebatur. Liv. XLIII. 13.

Jupiter Elicius, and that it was situated on a hill, namely, the Aventine Mount. But Tullus Hostilius, it is said, was in some retired part\* of his house, and alone.

A spear, however, might become electrical in a thunder storm, in which Tullus Hostilius is said to have perished, even in a house; witness the story from Livy, mentioned above: but we may suppose, that he might be on the house top, which was a common place of worship, and there have erected his apparatus for drawing down lightning. That this was a common place for idolatrous worship, we learn from the scriptures. The book of Kings† speaks of the altars, that were on the top of the upper chamber of Ahaz. Jeremiah‡ speaks of “the houses, upon whose roofs they have burned incense unto all the host of heaven, and have poured out drink-offerings to the gods.” Zephaniah|| mentions those “that worship the host of heaven on the house tops.” Might not

\* μελλοντος δε Τυλλου θυσιαν τινα κατ' οικον επιτελειν, αυτους μονον εβουλετο τους αναγκαιους ειδεναι, κατα τυχην της ημερας εκεινης χειμεριου σφοδρα γενομενης, κατα τε ομβρον και ζαλην και σκοτον. Dionys. Antiq. Rom. lib. III. p. 176, edit. Sylburg.

Is it not probable from hence, that these sacrifices were commenced on the approach of storms?

† Kings, book II. chap. xxiii. 12.

‡ Jerem. xix. 13. || Zephaniah i. 5.

then Tullus Hostilius, supposing him placed in an elevated situation, and upon the top of a building, and surrounded by, or in the neighbourhood of a number of spears, placed with their points upwards, receive a stroke by their means from an electrical atmosphere; or might not an electrical cloud be so attracted and discharged upon a multitude of metalline points, terminating in bad conductors, as to explode and destroy him, and burn the house: and might not Numa be instructed, how to conduct this process with greater safety, though, perhaps, not scientifically? But many a house is preserved by conductors, whose inhabitants, and even the artificers that erected them, are nearly ignorant of the rationale of the matter.

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ESSAY *on some supposed* DRUIDICAL REMAINS,  
near HALIFAX in YORKSHIRE; by Mr. THOMAS BARRITT.

READ OCTOBER 19, 1787.

ABOUT a mile westward of Saddleworth church, in the county of York, is a high hill, which commands an extensive prospect over the adjacent country. It is called, by the neighbouring people, POTS AND PANS. Upon the summit

summit are abundance of large craggy stones, (of that sort generally called mill-stone grit) lying scattered up and down, which, when viewed from the east, look like the foundation or ruins of some stupendous fabric. One of these stones, or rather two of them closely joined together, is called the PANCAKE; it is of an irregular square form, with obtuse angles, and hath upon its surface four basons, hollowed in the stone; the largest, being nearly in the center, is capable of holding eight or ten gallons of water, some say more: whether these hollows be natural, or artificial, is not known. This stone I measured, and found to be about seventy-six feet in circumference: another long uneven hole, upon this stone, is called Robin Hood's bed. A little westward of this, is another stone, about twenty feet in height, and about fifty-six feet in circumference at the base, but much narrower at the top, from whence proceed irregular flutings or ridges, down one side, of about two feet long, by some supposed the effect of time, and by others the workmanship of art. More westward, and nearer the valley of Greenfield, the ground is called Aldermans, and overlooks that valley, opposite to a large and high rock called Alphan. Upon the level of this ground, is a fissure in the earth, about twelve or fourteen yards long, each end terminating in a cavernous hole in the rock, one of which is capable of ad-

mitting dogs, foxes, or sheep; the other large enough to receive men. Neither of these cavities has been thoroughly explored by any one within memory; a person informed me that he had gone into the larger with a light, but returned, after having gone down a sloping descent of about sixty yards: tradition says, into the other hole once went a dog, in full chace after a fox, but neither of them ever returned.

To a superficial observer, unacquainted with ancient history, and busied only with the common occurrences of the present day, these rude remains may appear to be no more than the sport, or chance of nature, thus left, when the water of the general deluge quitted its earthly seat, and fixed its residence in its proper bed.

To guess at the transactions of remote ages, where we have no written authority, is, it must be owned, too often fallacious, and at best very uncertain; and some, whose pursuits do not coincide with such researches, may slight those attempts, which might lead to a discovery of actions so far back as "twice ten hundred years;" yet where we cannot attain complete knowledge, it is humbly presumed, a probable conjecture may be admitted.

Upon this ground of conjecture we may go, and say, that situations like these, and stones like those we describe, have been made use of in the most ancient idolátry, and particularly by the Druids of this island; who, as priests of its first inhabitants,

inhabitants, performed the rites of their religion upon high grounds, as most suitable to the solemnity of their worship; and they might suppose the Deity to be more propitious, when addressed from a lofty eminence, "they worshipped the whole expanse of heaven, and had open temples." Sacred history assures us this was the custom amongst idolatrous nations in the east. We are told in the history of the Jewish kings, that Josiah, zealous in the worship of the true God, went about to reform the Israelites, who had fallen into idolatry; that he destroyed the groves, the temples, and the high places that were before Jerusalem, and on the right hand of the mount of Corruption, which King Solomon had built for Ashtoreth, the idol of the Sidonians, and for Chemosh, the idol of the Moabites, and for Milchom, the abomination of the children of Ammon. The margin of our old Bibles informs us, it was the mount of Olives, that was called the mount of Corruption, because it was full of idols.

Now it may be allowed, that the residence of a Druid, thus elevated upon a mountain, would the better command respect from a surrounding crowd, who had an opportunity, for many miles around, of beholding the smoke ascend from a burning sacrifice.

The stone called PANCAKE, I shall venture to point out, as an altar once used for sacrifice, for

libations, for offering the fruits of the earth, for divination by the entrails of beasts, the flight of birds, by water, and other methods now not known.

Borlase, in his *Antiquities of Cornwall*, gives us a very accurate and learned account of Druidical history, and describes these stones, or karns, with great minuteness; and whoever will take the trouble to read his work, may be thoroughly convinced, that these stones in Saddleworth were originally for the same use with those which he describes in Cornwall.

In speaking of hollows, or basons, he says, "These basons are generally found on the highest hills, and on the tops of the most conspicuous karns: some are found sunk into thin flat stones, but they are oftener worked into more substantial and massive rocks." He seems not to allow of their being "designed for altars\* either of sacrifice, of libation, or holy fire" but I must say, that the stone called *PAN CAKE*, might be accommodated to those purposes with care. He thinks these basons wholly calculated for the Pagan superstitions of "lustration and purifications by water. The purest of all water is that which comes from the heavens in snow, rain, or dew; and of this the ancients were not ignorant; and therefore

\* Borlase allows that ancient heathen priests did sacrifice upon rocks.



“no water seems to bid more justly for the  
“preference in those sacred rites, than this.

“It may with great probability be advanced,  
“that so strict a sect as that of the Druids  
“could not be ignorant of so universal a cus-  
“tom, nor knowingly forbear to adopt so anci-  
“ent and specious a rite for a part of their sys-  
“tem: my opinion, therefore, is, that the  
“Druids, as well as other priesthoods, had the  
“rites of external purification by washings and  
“sprinklings; for this, they had their holy  
“water; that this holy water was rain or snow,  
“or probably both; and that these rock-basons  
“were vessels most ingeniously contrived to  
“procure that holy water. They likewise had  
“their waters of jealousy, as well as the Jews,  
“and, near the banks of the Rhine, used the  
“waters of that river to purge the suspected.

“These basons are mostly placed above the  
“reach of cattle, frequently above the inspec-  
“tion of man.” These long hollows, such as  
Robin Hood’s bed upon the stone called PAN-  
CAKE, Borlace supposes “were to receive  
“the bodies, of men and children for particular  
“disorders, that by the healing virtue attri-  
“buted to the god, who inhabited the rock,  
“they might be cured of their ailment; or,  
“by being prostrated on so holy a place, might  
“be fitted for, and consecrated to the service  
“of

“ of the rock deity, for which they were intended.”

In confirmation of the above, a notion hath prevailed to the present day, that the water in the bason, in the center of PANCAKE, will cure sore eyes, which superstition, I suppose, hath continued from the Druid-times, and seems to establish the existence of Druidism in this part of the country.

The water in the rock-basens, might serve to mix with their mistletoe, which was looked upon as a general antidote.

About half a mile north of PANCAKE, are several large stones piled upon each other, upon the highest of which is a hollow, or basen; these are called STAPELEY STONES. What the word stapeley may signify, is uncertain; it may come from the Belgic word stapel, a settled market; perhaps in this place necessary articles were sold to the Druids, and others who came to worship, the venders not being permitted to approach any nearer the sacred ground.

Similar stone basens are said to be found upon the commons, some miles distant, in the same county, which were allowed (by that able and judicious antiquary, the late Rev. Mr. Watson, rector of Stockport, in Cheshire) to be Druidical remains. Not far from this ground also, was found the stone celt, described by the  
Rev.

Rev. Mr. Whitaker, in his history of Manchester.

The large upright stone, about twenty feet in height, erected at some little distance from PANCAKE, I should fix upon as the stone, or idol, once here worshipped; around it are many very large stones, lying in all directions, as if tumbled one from off another. The general form of this stone is that of a large irregular wedge. Borlase says, "the Phœnicians adored deities of this form." The holes described before may be considered as highly necessary in the business of Pagan deception; from them answers might be given, and sounds and horrid noises might be heard, produced by persons concealed there for the purpose of astonishing deluded people, and by these secret ways, maintaining the credit of the Druidical hierarchy\*.

Ancient history informs us, that the priest of Apollo, at Daphne, near Antioch, when delivering his oracles, sat upon a small seat like a bushel, pierced with many holes, and placed over an aperture of the floor of the temple, through which the gale of inspiration was thought to arise.

It is not improbable that this part of the country was early peopled by those Celtæ, who

\* These conjectures are much strengthened by Major Rooke's observations on Druidical remains, published in the *Archæologia*.

owed their extraction to Phœnicia in Syria ; since we find the Celtiberi of Spain to be of Phœnician origin, as well as the founders of several cities in Italy ; and it may be difficult to prove the Celtæ of old Gaul, who inhabited between the rivers Garonne and Seine, to have sprung from any other source. Almost all writers agree, that the first inhabitants of this island had an intercourse with the Phœnicians, who are allowed to have traded to Britain, from those once famous sea ports Tyre and Sidon ; and where they left a colony, would no doubt leave with them, all the rites and ceremonies of their Syrian worship.

If it be admitted, that this hill has been dedicated to heathen worship, the ground called Aldermans, I should imagine to extend to the place where the idol once stood. The word Aldermans, I suppose not to be its original name, but to have been afterwards given by the Saxons, signifying, in their language, the elderman, or oldman, from a rock-idol or stone pillar, there once worshipped, by the Celtic Britons, the true name of which was unknown to the Saxons.

We read in the Levitical law, that Moses forbid the Israelites to rear up a standing image, or set up any stone in their land, to bow down to it or worship it. The adoration of stones was common at that day, we read, or why forbidden ? So that upon the whole I should conclude,  
that

that a rude stone pillar was once worshipped upon this hill; and the stone called PANCAKE, the altar, and the stones now lying dispersed about, once formed (though of rude materials) an heathen temple, which upon the prevalence of christianity, and the rise of more enlightened times, was destroyed, nay, is even to this day wasting more and more.

I was informed when there, that young people would assemble in fine weather, and with iron crows, and levers, amuse themselves by removing these large and ponderous stones from off each other, for the purpose of trying how far they would tumble, and how long they would be in rolling down the sloping hills. Thus we see the devouring teeth of time, determined, scarcely to leave one stone upon another upon this once sacred ground.

At Mow-Cop in Cheshire, is a rude upright stone pillar, called the Oldman at Mow, and said, by the country people, to be an idol, perhaps once used for idolatry, at the same time with this in Saddleworth.

*Account of an ANCIENT MONUMENT in HULN ABBEY, NORTHUMBERLAND ; by JOHN FERRIAR, M. D.*

READ MARCH 28, 1788.

THE monument here exhibited, was dug up, a few years ago, from among the ruins of the church of Huln Abbey, now in possession of the Northumberland family. The table is broken, as marked in the drawing.

No account of this curious monument has yet been published, and it is so covered with ivy, in its present situation, at the west end of the church, as to escape the observation of travellers ; who are generally attracted to visit the remains of the abbey, by the uncommon beauty of its situation, more than by antiquarian zeal.

Huln abbey, the first Carmelite monastery founded in England, was built in 1240, by Ralph Fresborn, under the patronage of William de Vescy, then Lord of Alnwick, and of the immense possessions of the Tysons, granted to Ivo de Vescy by the Conqueror. During the last of the Croisades, Vescy, with some other Northumbrian Gentlemen, visited the monastery on mount Carmel. They found there Fresborn their countryman,

tryman, one of the religious, and became so attached to him, as to desire that he might be permitted to return with them to England. The superior agreed to their request, on condition that Fresborn should found a Carmelite monastery in his native country. Fresborn chose a spot near the castle of his friend, to fulfil his obligation; the land was granted by Vesey; and Fresborn became the abbot. Tradition still denominates one of the largest towers of Alnwick castle, the Abbot's tower.

Some fancied resemblance to mount Carmel determined the site of Huln abbey. It is controverted, (as all truth is important) whether the hill on which the abbey stands, or an opposite eminence, were the object which occasioned this choice. However difficult this point may appear, it would ill become a lover of antiquity to omit an opportunity of deciding by conjecture. I must confess, then, it appears from a comparison with prints, that the site of the abbey resembles Carmel, and that the opposite rock, rising in a fine cone, almost from the brink of the river, has the appearance of mount Tabor.

But there needed not these associations of romantic devotion, in favour of a place, which, in Sandys's phrase, "would make solitariness delightful, and stand in competition with the turbulent pomp of cities."

Here,

Here, De Vesey was probably buried, and I conceive the monument before us to have formed the covering of his stone coffin,

It appears, from an inspection of many ancient monuments, that the cross was a common ornament for the covers of stone coffins, both before and after the conquest. Several specimens of this kind are brought together, in Gough's sepulchral monuments: in some, the cross is accompanied with the armorial bearings of the person interred. Our artist, with more taste, has introduced the arms and insignia of Vesey, in a kind of trophy, with very elegant fillets. I am not quite satisfied about the meaning of the wheel contained in the crest. Most of the crosses I have mentioned have a circular ornament on the top, sometimes enclosing a quatrefoil. The wheel, in this instance may allude to Vesey's travels. Or more probably it is that bearing known in books of heraldry, by the name of the *Catherine-Wheel*; a bearing, according to the Accidence of armory, proper to the most honourable persons only. It would be inaccurate not to observe, that the form of this wheel is different from that given to the Catherine-Wheel by the heralds; for in this before us, there are two concentric circles, in the outer of which, radii, like spokes, are drawn to the circumference; but whether this be a piece of ingenious flattery, by which the honour of the wheel is doubled, or  
whether



whether it refers to some particular incident in De Vescy's life—I believe we cannot determine.

The shield charged with a plain bend, on the right of the trophy, is said to be the ancient bearing of the Northumbrian Vescys. To whom the shield charged with a chevron, on the left, belonged, I have attempted in vain to determine. I do not remember, that it is to be found among the numerous escutcheons displayed on the gateways of the castle and abbey of Alnwick. Perhaps, in this instance, Time, in mockery of human pride, has restored the symbol of a family whose name and memory have perished. The sword and bugle horn, suspended on different sides of the trophy, intimate the baronial quality of the deceased. The monument, therefore, certainly commemorates a Baron de Vescy. But I am led to believe that this Baron was the patron of the monastery, not only from the place where the monument was found, but from a note in the old plan of the abbey, first published by Mr. Grose. *The Founder's tomb* is there marked, at the east end of the church, but no notice is taken of it, in the survey which accompanies the plan.

As it is a point undecided by authors, whether Fresborn erected the building at his own expence, or whether the munificence of his friend supplied that, as well as the park; and chiefly

because I am inclined to be of the latter opinion ; I apprehend that the title of founder of the monastery could only belong to William de Vesey. It is well known that the tombs of founders and benefactors of religious edifices were generally placed near the altar ; and nobody could say to a Norman Baron, *immemor sepulchri struis domos*.

So much of the monument of William de Vesey.—A vindication of this little disquisition may appear necessary to those who condemn the study of antiquities, as useless or uncertain. But I have ever thought, that pursuits, which add to the innocent happiness of life, are too respectable to require defence. A knowledge of antiquities implies labour and erudition, and I do not know that it disposes either to vice or folly. The charge of uncertainty can never be brought against this kind of knowledge, without recoiling on all systems ; and a true philosopher will beware of under-valuing any researches into human life ; especially such as interest our nature so strongly, as those of the antiquarian. For every one must feel, in some degree, on surveying the works of former ages, those sentiments, so well expressed in that exquisite passage, which Mr. Grose has selected, as the motto of his English antiquities ;

I do love these ancient ruins ;  
We never tread upon them but we set  
Our foot upon some reverend history.

And

And questionless, here, in this open court,  
Which now lies naked to the injuries  
Of stormy weather, some men lie interred,  
Lov'd th' church so well, and gave so largely to't,  
They thought it should have canopy'd their bones.  
Till doomesday. But all things have an end.  
Churches and cities, that have diseases like to men,  
Must have like death that we have.

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*On the NATURE and UTILITY of ELOQUENCE; by*  
RICHARD SHARP, F. S. A.

“ Fructu, et populari estimatione, Sapientiæ Eloquentiæ cedit. Ita enim Salomon, *sapiens corde appellabitur prudens, sed dulcis eloquio majora reperiet*; haud obscure innuens, Sapientiam famam quandam, et admirationem cuiuspiam conciliare, at in rebus gerendis et vita communi, eloquentiam præcipuè esse efficacem.”

Bacon de Augm. Scien. lib. VI. cap. 3.

READ NOVEMBER 2, 1787.

**I** MUST hope to be forgiven, for owning that I consider myself as running some risque, in venturing to solicit the attention of the Society, when I have nothing to offer but a few thoughts concerning such a kind of subject as Eloquence. Generally prevalent as the study of Physiologie is at present, in this kingdom, and particularly cultivated

vated as this science is by so many of the most eminent members of the Society, I should be somewhat surprized if the philosophy of the fine arts were held in much estimation. I never could, and I hope I never shall allow myself to speak, or think disrespectfully of other men's pursuits, merely because they differ from mine; but surely I may be permitted to say, that the study of that grand and seducing science, Natural Philosophy, has a tendency to excite in its followers, low ideas of arts as useful as any that can be founded even upon its noblest discoveries. It is true, that in distinguishing the arts from each other, the fine arts have been usually opposed to the useful; but is not this improper? and would it not be better to consider them as divided into the liberal and the mechanical? Had I thought eloquence to be a fine art only, in the common sense of that term, I should, in the first instance, have probably saved myself the trouble of thinking or writing about it at all, but, in the second, I should certainly have spared the Society the trouble of reading what I had written. Eloquence, so far as it is an art, is undoubtedly classed with propriety, among the fine arts, since the means it uses to effect its purposes are not mechanical, and inasmuch as it is so constantly connected with the strongest exercises of the imagination; but surely it can never be excluded from an eminent place among the useful arts;

arts, so long as men have prejudices to be attacked ; fears to be allayed ; hopes to be excited, or passions to be moved ; and so long, it may be added, as they have understandings to be informed. For, perhaps, the most extensive field for the display of real ability in speaking, is the rich, the vast, and hitherto uncultivated tract of *probable evidence*.

Within the sphere of demonstration indeed, eloquence has but little to do, having only room enough to exhibit two of her lowest qualities, perspicuity and order : but demonstration, though absolute so far as her power extends, reigns over a very narrow territory. I will not presume to go quite so far as D'Alembert, and say of eloquence, “ Les prodiges, qu'elle opere souvent  
“ entre les mains d'un seul sur toute une na-  
“ tion, sont peut être le témoignage le plus  
“ eclatant de la superiorité d'un homme sur un  
“ autre \* ;” but still, that art which teaches us how we are likely, in the most effectual manner, to make ourselves masters of other men's minds by speech, must be permitted to rank very high in the scale of useful studies.

It has in truth been common with those men of sense, who have themselves been deficient in expression, to speak with contempt of the eloquence of others, and to represent it as useless

\* Discours preliminaire a l'Encyclopedie.

at least, if not highly dangerous; nay, some men have very dexterously and successfully used the art itself to decry its importance, and vilify its tendency\*. *Quod sit indignissimum*, says Quintilian, *in accusationem orationis, utuntur orandi viribus*†.

"It is evident," says Mr. Locke, "how  
 "men love to deceive; and be deceived,  
 "since rhetoric, that powerful instrument of  
 "error and deceit, has its established pro-  
 "fessors, is publicly taught, and has always  
 "been had in great reputation‡." What  
 "is the end of eloquence," says Warbur-  
 ton in the chapter already referred to, "but  
 "to stifle reason, and inflame the passions?"  
 The prejudices of Mr. Locke were undoubtedly honest, but they plainly show that he mistook the abuse of the art for the art itself; and happily for mankind, my Lord Bacon's observation is true||: "No man can well speak fair of  
 "things fordid and base, but in things honest

\* The instances of this self-condemning censure are very numerous, but there are few examples of it so remarkable, or so entertaining, as a long passage in Plato's *Gorgias*, and another in the ninth chapter of Warburton's *Doctrine of Grace*.

† Lib. II. cap. 15.

‡ Essay on Human Understanding, book III. ch. 10.

|| De rebus sordidis, et indignis non posse quempiam pulchre loqui, at de rebus honestis facillime. De Augm. Scient. lib. VI. cap. 3.

"it

“ it is an easy matter to be eloquent.” To the Bishop’s authority it may be objected, as Thucydides says it was to Cleon’s, “ that because he used to hold the bad side in the causes he pleaded, therefore he was ever inveighing against eloquence and good speech\*.” It were easy to multiply the examples of such misrepresentations; the sophists and the fathers of old, the metaphysicians and theologians of late, have united in abusing an art, which they wanted judgment as well as taste to understand. Yet in all the various instances of these inconsiderate attacks, it ever appeared to me, that the objections and censures constantly arose from a misconception of the real nature of the art.

How often is the epithet eloquent applied to some ignorant coxcomb, who in every gesture, look, and word, offends against the first rudiments of speaking! forgetting, *Ars est celare artem!* How many times must every man have heard the title of Orator given to some wretched phrase-monger, whose skill consisted only in the frequent use of a gaudy word, or an affected antithesis! Thus has this efficacious and important art become disreputable, and been of course disregarded by many great and wise men, even among those whose professions are con-

\* Thucyd. lib. III.

nected with the daily practice of public speaking. But this misconception is far from being peculiar to those who have not attended to the subject; for perhaps it is hardly possible to produce any definitions of rhetoric from the ancient, and there are but few to be found in the modern writings that treat of it, which do not either lay it open to just objections, or degrade its importance, by confining its powers and its application.

It cannot but have been matter of some surprise to such as are conversant with the works of the most celebrated Rhetoricians, that they should differ so generally and so widely respecting the nature of the art which they profess to teach. In the fifteenth chapter of his second book, Quintilian states and refutes a great variety of differing definitions, which, even in his time, had been given of rhetoric, and he censures among others, those that rested on the formidable authority of names no less eminent than Isocrates, Plato, Aristotle, and Cicero. He then proceeds to express and support his own opinion; but with less skill, and less success than he had attacked the sentiments of his predecessors. The same irreconcilable variety of opinion prevails among later writers, on this subject, which, to say the truth, has been considered by so many able authors, and by some of such exalted reputation, that I  
 chuse



chuse to mention this difference among them, as an apology for presuming to go over the ground which such men have trodden. Since all cannot be right where all disagree, the authority of one serves to counterbalance that of another; and thus a man may be allowed to differ from any of them, without dreading the imputation of vanity. Aristotle says it is the office of rhetoric

“Οὐ τὸ ΠΕΙΣΑΙ ἀλλὰ τὸ ἰδεῖν τὰ ὑπαρχοῦσα ΠΙΘΑΝΑ περὶ τῶν πραγμάτων.” Rhet. lib. I. C. 1.

“Officium autem ejus facultatis videtur esse, dicere appositè ad persuadendum.” Cicero de Inven. lib. I. S. 5.

“Nihil enim est eloquentia, nisi copiosè loquens sapientia.” Cicero Orat. Part. S. 23.

“Scientia benè dicendi.” Quin. lib. II. cap. 15. •

“Est igitur frequentissimus finis rhetorices vis  
“*persuadendi.* Hæc opinio originem duxit ab  
“*Isocrate*: apud *Platonem* quoque idem fere di-  
“cit.” Quin. lib. II. cap. 15.

“L'Eloquence est le talent d'imprimer avec  
“force, et de faire passer avec rapidité, dans l'ame  
“des autres le sentiment profond dont on est pene-  
“tré.” D'Alembert sur l'Elocution Oratoire.

“Oratory is the natural faculty of speech  
“improved by art.” Dr. Prestley's Lectures  
on Oratory and Criticism.

“Eloquence

“Eloquence is the power of speaking with fluency and elegance.” Dr. Johnson’s Dictionary.

“Eloquence is the art of speaking or writing well, so as to move and persuade.” Chambers’s Cyclopædia. Dr. Rees’s Edit.

This is but a small sample of the various modes of speaking concerning the subject; but no more need be produced, and to me all these appear either false or imperfect. Perhaps the most sensible, most substantial, and most useful idea of eloquence, is that expressed by Dr. Campbell, in the first sentence of his *PHILOSOPHY OF RHETORIC*. “Eloquence is that art or talent by which a discourse is adapted to its end.” The same sentiment is intimated by Quintilian, when he says, *Quo quisque plus efficit dicendo, hoc magis secundum naturam eloquentiæ dicit*\*. “Whatever composition †,” says Mr. Wilkes, in one of his speeches, “produces the effect which is intended, in the most forcible manner, is, in my opinion, the best, and most to be approved. That mode should always be pursued: it has the most merit, as well as the most suc-

\* Lib. XII. cap. 10.

† Instead of “whatever composition produces the effect,” he should have said, whatever composition is *best calculated to produce* the effect. The passage would then be incontrovertible.

“cels,

“ cefs, on the great theatre of the world, no  
“ lefs than on the ftage, whether you mean to  
“ infpire pity, terror, or any other paffion.”  
It may, perhaps, be objected, that the word elo-  
quence has generally been ufed in a more limited  
fence, and to fay the truth, it has by many been  
applied to denote ornamental compofition only :  
but has not this arifen from a miftake, by which  
a part of the art has been taken for the whole ?  
This has been the cafe with poetry, and it is  
amufing to obferve the difficulties into which the  
error has brought many learned men, in their  
attempts to fettle the nature and effential quali-  
ties of this noble art. Some have thought it’s  
nature to confift in imagery, fome in imitation,  
fome in fiction, fome in metre, and in others in  
paffion ; whereas, thefe are only fo many differ-  
ent means employed by the poet to effect his  
purpofes, and are all mere parts of that, of  
which it has been fupposed they conftitute the  
effence. However, let the common meaning of  
the term be what it may, we are not now confi-  
dering the proper acceptation of a word, but the  
real nature of a ferious art. The exiftence of  
fuch an art can hardly be doubted, for that would  
be to queftion whether men fpeak beft by acci-  
dent or by defign ; when they take no thought,  
or when they previously confider what they are  
about to do. Nature, it muft be confeffed, does  
much, and will not only lead, but compel us,  
on

on interesting occasions, to use those forms of speech (even the most complex) which rhetoricians have arranged and named. Perhaps no language is more *natural* than that which abounds with figure and allusion. Yet still ability alone is not sufficient; and a living man, of high rank in politics, might be pointed out, who, though gifted far beyond any of his cotemporaries, and greatly superior to them in acquirements, has yet been often found an useless, and sometimes a dangerous auxiliary, because he wanted the skill to manage his prodigious powers. He is ever saying something only for the sake of saying it; merely because it is singular, beautiful or sublime, and without any regard to its effect on his auditors. A real thought he never can dismiss, till he has made it the subject of innumerable comparisons, or darkened it by superabundant illustration. If it be possible for such a waste of talents to be occasioned by a deficiency in the art we are speaking of, it may not be amiss to consider, whether the definition of it given by Dr. Campbell be the true one, and, at the same time, to examine the opinions of the other celebrated writers, whose definitions I have quoted, as they are maintained and defended by two authors of great reputation, and of peculiar abilities for the discussion of such a subject, Dr. Browne and Dr. Leland, both of whom have stated their sentiments at length; the former in his

his **ESSAY ON RIDICULE**, and the latter in his **DIS-SERTATION ON THE PRINCIPLES OF HUMAN ELOQUENCE**.

Dr. Browne speaks thus: "As eloquence is of  
" a vague, unsteady nature, merely relative to  
" the imaginations and passions of mankind;  
" so there must be several orders and degrees  
" of it, subordinate to each other in dignity,  
" yet each perfect in its kind. The common  
" *end* of each is persuasion: the means are dif-  
" ferent, according to the various capacities,  
" fancies and affections of those whom the artist  
" attempts to persuade. The pathetic orator  
" who throws a congregation of enthusiasts into  
" tears and groans, would raise affections of  
" a very different nature, should he attempt to  
" proselyte an English parliament. As on the  
" other hand, the finest speaker that ever com-  
" manded the house, would in vain point  
" the thunder of his eloquence on a quaker  
" meeting." *Essay on Ridicule*, sect. III.  
p. 32.

Of this passage, says Dr. Leland; "This is  
" plausibly and ingeniously urged, but the whole  
" argument is founded on the supposition, that  
" eloquence and persuasion are one and the  
" same, and that to be denominated an orator,  
" no more is necessary than to influence and  
" move the hearer. A supposition which can-  
" not be admitted, however witty men may  
" have

" have talked of the 'eloquence of *silence*,' or  
 " the 'eloquence of *nonsense*.' *Persuadent enim di-*  
 " *cendo,*" saith Quintilian, "*vel ducunt in id quod*  
 " *volunt, alii quoque meretrices, adulatores, cor-*  
 " *ruptores.* (lib. II. cap. 16.) The alluring ac-  
 " cents of an harlot move the sensualist; the  
 " abject and extravagant praises of a flatterer  
 " move the vain man; and the plain promise of  
 " a large reward, expressed without trope or  
 " figure, may have the greatest power over the  
 " conduct of a traitor or an assassin. But it will  
 " by no means follow, that the harlot, the flat-  
 " terer, or the suborner is *eloquent*. To merit  
 " this praise a man must persuade (if he does  
 " persuade) by the real excellencies, the engag-  
 " ing and conciliating qualities of speech. Ac-  
 " cordingly, Aristotle tells us it is the office of  
 " rhetoric, *videre quæcunque apposita sint ad per-*  
 " *suadendum in quaque re.* So that the doctor's  
 " orator, who throws a congregation of enthu-  
 " siasts into tears and groans, is, in reality, no  
 " orator at all, because he owes his influence,  
 " not to clearness and strength of reasoning, not  
 " to dignity of sentiment, force, or elegance of  
 " expression, and the like, but to senseless ex-  
 " clamation, unmeaning rhapsody, or to gri-  
 " mace, to a sigh, to a rueful countenance;  
 " and if he would in vain endeavour to prose-  
 " lyte an English parliament, it is for this very  
 " reason, because he is no orator, nor can any  
 " man

“ man without any one of the *apposita*, the rational excellencies and engaging qualities of speech, be said to possess a degree of eloquence perfect in its kind.” Leland’s Dissertation, ch. XIV.

What Leland says of Browne’s, may be as justly said of his own argument, that it is plausibly and ingeniously urged ; but probably the opinion of neither is true. Although it may be acknowledged that “ Eloquence is relative to the imaginations and passions of men,” yet it does not therefore follow, that it is of a “ vague, unsteady nature.” It might as justly be said, that the art of music is of a vague, unsteady nature, because it produces compositions so infinitely various ; or that the art of the painter is liable to the same reflection, because it is sometimes exercised on copper and sometimes on canvas. The arts themselves are fixed, steady and immutable ; it is only the objects on which they operate, that are various and perishable. Neither is it true, that the *only end* of all eloquence, is persuasion. An orator undoubtedly often aims to persuade, but he generally has some other end in view. He frequently wishes to alarm, to rouse, to depress, to excite our pity, or to fire our indignation, and sometimes is only desirous to delight the imagination. Now these different objects can never be reduced under the general head of persuasion,

suaſion, without departing moſt unwarrantably from the common acceptation of that term. The ingenious inſtances adduced in the laſt ſentence of the quotation from Browne, are certainly not ſufficient to prove either of his poſitions, nameſy, that eloquence is of a vague, unſteady nature, or that the common end of all eloquent diſcourſes, is perſuaſion. The answer juſt given to the principles themſelves, will alſo deſtroy the application of theſe inſtances. And, in truth, the facts which he takes notice of may be accounted for, in a much more reaſonable and unobjectionable manner.

That the methodiſt preacher would produce no other effect, in parliament, but that of making himſelf ridiculous, is unqueſtionable, and why? becauſe, in attempting to affect the houſe, by the uſe of the ſame means as thoſe that are ſucceſſful in his own pulpit, he would ceaſe to be eloquent. He would be violating one of the fundamental rules of rhetoric, which teaches us, that a ſpeaker ought to have a conſtant regard to the quality of his audience. His ill ſucceſs, therefore, would be owing to his want of art. He would fail, becauſe he was ineloquent. The eloquence which he had diſplayed on his own ground would ſtill remain unimpeachable, and he would be in a ſituation ſimilar to that of a ſtatuary, who is able to exerciſe his art only upon marble.

The



The same reasoning is just as applicable to the parliamentary speaker, who should point the thunder of his eloquence on a quaker-meeting. The thundering sort of eloquence would here be misapplied, and how many soever he might use of those conciliating qualities of speech, which Leland speaks of, he would still be unsuccessful, because his speech would not be *ad homines*. Dr. Leland's remarks are truly sensible, and would not be liable to objection, if altered but a little. The addition to be recommended, is a short explanation of what he means by those rational and real excellencies, those conciliating qualities of speech, which he repeats, as the basis of his reasoning. Had he been called upon for such an explanation, he would, I am persuaded, have expressed himself so, as to deviate materially from the truth of the case. He would probably have said, that Nature had at first suggested certain forms of speech, which rhetoricians had arranged and settled, and that these he meant to describe by the terms, rational and real excellencies, engaging and conciliating qualities. This others *have* said, and to such let it be answered, that perhaps the most common faults of all bad writing arise from this supposition, of something intrinsically excellent and eloquent in certain forms of speech, even when considered without any view to the effects they are fitted to produce.

Most writers, it must be confessed, employ tropes and figures because they *are* tropes and figures, and not because they are calculated to produce certain effects on the minds of their readers or hearers. The term conciliating is itself relative, and supposes somebody to be conciliated; and these conciliating qualities of speech must vary, as much as the tempers and understandings of those who are to be conciliated. That which is a conciliatory quality in a methodist congregation is not so in parliament, and that which is so in parliament, is not so in a quaker-meeting.

The grimaces and rueful exclamations, which Leland supposes are so effectual in a conventicle, are certainly more useful than even his conciliating qualities and rational excellencies of speech; but it is also true, that exclamations more pathetic, and gestures more natural, would be still more effectual, even in an assembly of enthusiasts; and the tears and groans produced by these grimaces only shew the great advantage of appropriating and adapting both style and gesture, since he himself allows, that these awkward attempts at speciality and adaptation, have more effect than the most polite and splendid oration, if composed and delivered without any regard to the peculiarities of the audience. Yet although the variety of temper, intelligence, customs, opinions and prejudices, among mankind, is very  
great

great, there are at bottom certain leading principles, certain master-passions and prevailing prejudices that all men have in common, which form the character of the species, and greatly overbalance all accidental and acquired differences. Variety of character is undoubtedly one of the characteristics of man, but similarity is a more important one. We all both resemble and differ from each other, in countenance and form, as well as in the turn and quality of our minds. Just so it is in the art of eloquence ; the kinds are as various as the kinds of men, and yet all arise from a few fixed and invariable principles, and no other forms of speech can deserve the names which Leland has given them, but such as are addressed to those qualities in human nature, which every perfect individual of the species is found to possess. Such qualities there undoubtedly are, and so far as we are all alike, so far are the rules of eloquence invariable, so far must a speaker's addresses to our understandings and tempers, be in all cases the same. In what situation, or at what season, would it be wrong that the style should be proportioned to the subject, should be perspicuous in explanation, accurate in reasoning, decorated in giving delight, or animated in exciting passion ? That the opening of a speech should not betray insolence or conceit ; that the narration

should be intelligible; that the arguments should be cogent; that the arrangement should be advantageous; that the expression should be suitable; that the pronunciation should be varied and distinct; these are not the precepts of one age or one country: they are as necessary to be observed at this time, as they were when Aristotle or Quintilian first inculcated them.

Instead, therefore, of concluding with Dr. Browne, that eloquence is of a vague, unsteady nature, or with Leland, that the enthusiast would fail because he is no orator, let these inferences be drawn; that eloquence is fixed on steady and unchangeable principles; that it is exceedingly extensive in its use, and relates to every kind of discourse or speech that can be imagined: that he who follows its precepts in one instance, is in that instance truly eloquent, however he may fail of success, when attempting another kind of speaking, whether it be of a higher or lower degree; and, in short, let Dr. Campbell's definition be thought the true one, when he says, that "Eloquence is the art by which a discourse is adapted to its end." This definition solves all difficulties, explains, and, as it were, embodies all rules, and is the grand axiom, by which the propriety of every subordinate rhetorical precept must finally be tried. If such conclusions can be satisfactorily drawn from the foregoing thoughts,

the

the examination of the subject has not been useless. For it is plainly of material consequence, to be right in the first principles of a practical question, since real conduct in life and business cannot but be greatly affected by their truth or falsehood. He who thinks eloquence to be the art of deceiving, with Mr. Locke, will, if he be a good man, never study to be eloquent. He who thinks it is speaking ornamentally, will be speaking ornamentally, when speaking plainly would have been more efficacious. He will, most probably, be lavish of his tropes and figures, when these ambitious decorations should have been shunned, or employed with the most sparing caution. He who thinks it consists in moving the passions, will often be weeping unaccompanied by the tears of his audience : and he who thinks it is the art of persuading, will not unfrequently be urgent when he ought to be instructive, or using vehement entreaties instead of powerful proofs. He, and he only, will not be cramped in the exercise of his art by the narrowness of his principles, who thinks it is the art of speaking and writing, in such a manner as is most likely to obtain the ends which he proposes to himself in speaking or writing. Does he address the multitude ? He will aim at being perspicuous, intelligible and impassioned. Does he speak before men of learning, and such as are

eloquent themselves? He will endeavour to be unaffected, rational and concise. Does he desire to convince? He will reason. Does he wish to give delight? He will be copious, flowing, rich in imagery, and elegant in expression: nothing will be harsh, nothing careless; nothing unpolished or repulsive. Does he mean to agitate or persuade? He will be warm, animated and glowing. He will arm himself with the thunders and lightnings of eloquence; or will speak in the mild, insinuating tone of gentle insinuation; with “bated breath and whispering humbleness.” In short, he will at all times accommodate himself to his situation; he will be

*Orpheus in filvis, inter delphinas Arion.*

Yet this is not all his praise, for it is not only on public and solemn occasions that he will find opportunities to use his manifold skill\*—his eloquence is not only fitted for the bar, the pulpit, or the public assemblies of the state, but for the numberless interesting occurrences of private life, and may even descend to the narration of events; the composition of a letter, or the dexterous management of common conversation.

\* *Is orator erit, mea sententia, hoc tam gravi dignus nomine, qui quæcumque res inciderit, prudenter, et compositè, ornatè, et memoriter dicat. Cic. de Or. lib. I. sect. 15.*

To men who have lived in the world, and seen real affairs, the utility of such a varied, accommodating and ready skill, cannot but be obviously apparent. It is thus spoken of by Lord Bacon, and is set down by him among the desiderata.

“ Surely it will not be amiss to recommend  
“ this whereof we now speak, to a new inquiry,  
“ to call it by name, The Wisdom of private  
“ Speech, and to refer it to deficiencies; a thing  
“ certainly which the more seriously a man shall  
“ think of, the more highly he shall value”\*. But  
setting aside the evident advantages arising from  
a superior ability in delivering one’s sentiments  
on great occasions, and even omitting to lay  
any stress on the obvious utility of the same  
skill when exerted in a man’s private affairs;  
the pleasures that arise from fine writing are so  
great, so various, so often to be communicated,  
and so easy to be obtained, that this consideration alone would defend the art from the imputation of insignificance. For I can never be

\* Certe, non abs re fuerit, circa hoc ipsum, de quo nunc dicimus, novam instituere inquisitionem, eamque nomine Prudentiæ sermonis privati indigitare, atque inter desiderata reponere: rem certe, quam quo attentius quis recogitet, eo pluri faciet. De Augm. Scient. lib. VI. cap. 3.

brought to believe that they are unprofitably employed, who are constantly increasing the daily pleasures of their fellow creatures ; who can contrive, without corrupting men's minds, to divert and entertain them. Shall those be called unprofitable labours, which deliver a private man from the influence of his domestic anxieties ; an artizan from the effects of his labour ; a soldier from his sufferings ; a statesman from his cares : which enable one man to forget his poverty, another his disease, a third his captivity, and all, their misfortunes ?

Who are these severe judges that are ever insisting upon the exclusive excellence of the mechanical, commercial, or even philosophical employments ? as if those employments were good for any thing, considered separately from the end which they aim at in common with works of imagination, THE PROMOTION OF HAPPINESS. Are there any of them that tend more immediately to this great purpose ? Which of them has more power to refine the manners, to soften the temper, to diffuse tranquility and cheerfulness ; to correct and enlarge the mind ? Away then with such short-sighted objections, and let those that chuse it prefer the man who makes a blade of grass grow where it grew not before, to the poet and the moralist, who water the sickly seeds of virtue,  
and



and cause a rich harvest of good deeds to spring up, from the barren and unfriendly soil of a depraved or neglected heart.

Not far beneath the hero's feet,

Nor from the legislator's seat,

Stands far remote the bard.

Though not with public terrors crown'd,

Yet wider shall his rule be found ;

More lasting his award.

Lycurgus fashion'd Sparta's fame,

And Pompey to the Roman name,

Gave universal sway :

Where are they ?—Homer's reverend page

Holds empire to the thirtieth age,

And tongues and climes obey.

AKENSIDE on the Use of Poetry.

TO THE REV. DR. BARNES.

S I R,

**I** BEG your acceptance of the following paper ; and if you think that it deserves the attention of your Philosophical Society at Manchester, I take the liberty of requesting you to present it to that learned body. I have the honour to be,

S I R,

Your most obedient humble Servant,

TURNHAM GREEN,  
MIDDLESEX, Dec. 2. 1787.

JOHN ROTHERAM.

*Some PROPERTIES of GEOMETRICAL SERIES explained in the SOLUTION of a PROBLEM, which hath been thought indeterminate. By JOHN ROTHERAM, M. D.*

# P R O B L E M.

Given, the sum (*a*), and the sum of the squares (*b*), of any Geometrical Series: to determine the Series.

**S**INCE every Geometrical Series, as,  $x \ x r \ x r^2 \ x r^3 \dots$  to  $x r^{n-1}$  is universally expressed by three quantities, viz. *x*, the first term,  
*r*, the

$r$ , the common ratio, and  $n$ , the number of terms; and since there are only two conditions, given by the problem, whence these three quantities are to be found, it hath hitherto been thought indeterminate, or one that would admit infinitely many answers.

In an infinite geometrical series, whose sum,  $x + xr + xr^2 + xr^3$ , &c. ad infinitum  $= a$ , is a finite quantity, it is evident that  $r$ , the common ratio, must be less than unity: but it may be either a positive or a negative quantity. If it be a positive quantity, then it must be a proper fraction; but if negative, it may be either a proper fraction, or an improper fraction, or a whole number. If  $r$  be positive, the series will be,  $x + xr + xr^2 + xr^3$ , &c. ad infinitum; but if negative, it will be  $x - xr + x^2r^2 - x^3r^3$ , &c. ad infinitum. I shall first solve the general case where  $x + xr + xr^2 + xr^3$ , &c. ad infinit.  $= a$ , and  $x^2 + x^2r^2 + x^2r^6 + x^2r^8$ , &c. ad infinit.  $= b$ .

If the first of these equations be multiplied by  $r$ , it will be  $xr + xr^2 + xr^3 + xr^4$ , &c. ad inf.  $= ar$ ; and this, taken from the first, leaves  $x = a - ar$ .

If the second equation be multiplied by  $r^2$ , it will be  $x^2r^2 + x^2r^4 + x^2r^6$ , &c. ad inf.  $= br$ , and this, taken from  $x^2 + x^2r^2 + x^2r^4$ , &c. ad inf.  $= b$ , leaves  $x^2 = b - br^2$ .

But

But  $x = a - ar$ , whence  $x^2 = a^2 - 2a^2r + a^2r^2$ ,  
and consequently,  $b - br^2 = a^2 - 2a^2r + a^2r^2$ .

Whence, after proper reduction,  $r = \frac{a^2 - b}{a^2 + b}$ .

This value of  $r$  being substituted in the equation  $x = a - ar$ , gives, after proper reduction,

$x = \frac{2ab}{a^2 + b}$ . Whence,  $x$  and  $r$  being found, the series will be known.

EXAMPLE. Let  $a = 24$ , and  $b = 192$ ; then  
 $r = \frac{a^2 - b}{a^2 + b} = \frac{576 - 192}{576 + 192} = \frac{384}{768} = \frac{1}{2}$ ; and  $x = \frac{2ab}{a^2 + b}$   
 $= \frac{24 \times 192 \times 2}{768} = 12$ ; and the series is 12, 6, 3,  $1\frac{1}{2}$ ,  
 $\frac{3}{4}$ ,  $\frac{3}{8}$ ,  $\frac{3}{16}$ , &c. ad inf.

Again. Let  $a = 243$ , and  $b = 29524\frac{1}{2}$ ; then  
 $r = \frac{1}{3}$ , and  $x = 162$ ; and the series will be 162,  
54, 18, 6, 2,  $\frac{2}{3}$ ,  $\frac{2}{9}$ ,  $\frac{2}{27}$ , &c. ad infinitum.

In the infinite series  $x + xr + xr^2 + xr^3$ , &c. ad  
inf.  $= a$ ,  $a = \frac{x}{1-r}$ , because,  $x = a - ar$ , as above.

By a similar deduction,  $b = \frac{x^2}{1-r^2}$ . For the same  
reason, if  $xr^n$  be the first term of an infinite  
series ( $n$  being any positive whole number) then,  
 $a = \frac{xr^n}{1-r}$ , and  $b = \frac{x^2 r^{2n}}{1-r^2}$ .

The finite series  $x + xr + xr^2 + xr^3 + \dots$  to  
 $xr^{n-1}$  is the difference of two infinite series, of  
which  $x$  is the first term of the greater, and  $xr^n$   
of the less series, and consequently the sum of  
the

the finite series will be  $\frac{x}{1-r} - \frac{xr^n}{1-r}$  or  $\frac{x-xr^n}{1-r}$ ;

and the sum of the squares will be  $\frac{x^2}{1-r^2} -$

$\frac{x^2 r^{2n}}{1-r^2}$  or  $\frac{x^2 - x^2 r^{2n}}{1-r^2}$ : i. e.  $a = \frac{x-xr^n}{1-r}$ , and  $b =$

$\frac{x^2 - x^2 r^{2n}}{1-r^2}$ ; and if  $x$  be taken for the least term,

and  $xr^n$  for the greatest, in which case  $r$  will

be greater than unity, then  $\frac{xr^n - x}{r-1} = a$ , and

$\frac{x^2 r^{2n} - x^2}{r^2 - 1} = b$ . From these two equations

only, it is impossible to obtain the values of the three unknown quantities,  $x$ ,  $r$ , and  $n$ ; recourse must therefore be had to another property of the series.

Let there be given  $x + xr + xr^2 + xr^3$ , &c. .... to  $xr^{n-1} = a$ ; and  $x^2 + x^2 r^2 + x^2 r^4$ , &c. .... to  $xr^{2n-2} = b$ , where  $x$ ,  $r$ , and  $n$  are whole positive numbers. Then the latter of these equations divided by the former, gives  $x - xr + xr^2 - xr^3 + xr^4 - xr^5$ , &c.  $= \frac{b}{a}$ . If this be added to the first equation, the sum will be,  $2x + 2xr^2 + 2xr^4$ , &c.  $= a + \frac{b}{a}$ ; and, if it be subtracted, the difference will be,  $2xr + 2xr^3 + 2xr^5$ , &c.  $= a - \frac{b}{a}$ . Again, let  $2x + 2xr^2 + 2xr^4 + 2xr^6$ , &c.  $= a + \frac{b}{a}$  be divided by  $2xr + 2xr^3 + 2xr^5$ , &c.  $= a - \frac{b}{a}$ , the quotient will give  $r$ , and the remainder

remainder  $2x$ ; as will appear by the operation ;  
 $2xr + 2xr^3 + 2xr^5, \&c.) 2x + 2xr^2 + 2xr^4 + 2xr^6, \&c. ($   
 $r, \text{ in the quotient } \frac{2xr^2 + 2xr^4 + 2xr^6, \&c.}{2x} \text{ the re-}$

mainder.

Hence this general Rule. Divide the sum of the squares by the sum of the series. Add the quotient to, and subtract it from, the sum of the series. Divide the greater of these two numbers by the less; the quotient of this second division shall be the common ratio, and the remainder twice the first term.

**EXAMPLE I.** Let  $a = 242$ , and  $b = 29524$ . Then  $\frac{b}{a} = 122$ , and  $242 + 122 = 364$ , and  $242 - 122 = 120$ ; and  $364$  divided by  $120$ , gives  $3$  in the quotient, for the common ratio, and  $4$  in the remainder, the half of which,  $2$ , for the first term of the series. And, these being known, the number of terms will be found by the common rules. Whence the series is  $2, 6, 18, 54, 162$ .

**EXAMPLE II.** Let  $a = 68887$  and  $b = 2372950489$ ; then  $\frac{b}{a} = 34447$ , and  $a + \frac{b}{a} = 103334$ , which divided by  $a - \frac{b}{a} = 34440$ , gives, in the quotient,  $3$  for the common ratio, and in the remainder  $14$ , the half of which,  $7$ , for the first term; whence the series is  $7, 21, 63, 189, \&c.$  to  $9$  places.

**EXAMPLE**

EXAMPLE III. Let  $a = 1820$ , and  $b = 1660750$ ; then  $\frac{b}{a} = 912\frac{1}{2}$ , and  $a + \frac{b}{a} = 2732\frac{1}{2}$ , and  $a - \frac{b}{a} = 907\frac{1}{2}$ ; and  $2732\frac{1}{2}$  divided by  $907\frac{1}{2}$  gives 3 in the quotient, and 10 in the remainder, thus

$$\begin{array}{r} 907\frac{1}{2}) 2732\frac{1}{2} (3 \\ \underline{2722\frac{1}{2}} \end{array}$$

10

so that 3 is the common ratio, and 5 the first term; and the series is 5, 15, 45, 135, 405, 1215.

EXAMPLE IV. Let  $a = 75$ ,  $b = 2125$ ; then  $\frac{b}{a} = 28\frac{1}{3}$  and  $a + \frac{b}{a} = 103\frac{1}{3}$  divided by  $a - \frac{b}{a} = 46\frac{2}{3}$ , gives 2 in the quotient, and 10 in the remainder; so that the series is 5, 10, 20, 40.

It remains that something be said of the series  $x - xr + xr^2 - xr^3$ , &c. ad infinit. Here  $r$  is negative; and since  $\frac{x}{1-r} =$  the sum of the series  $x + xr + xr^2 + xr^3$ , &c. ad infinit. consequently, by changing the sign of the quantity  $r$ , i. e. by writing  $\frac{x}{1+r}$  instead of  $\frac{x}{1-r}$  the sum of the series  $x - xr + xr^2 - xr^3$ , &c. ad inf. will be  $\frac{x}{1+r}$

If in this series  $r = 1$ , then the series is  $x - x + x - x + x$ , &c. ad infinitum, and its sum  $= \frac{x}{1+1} = \frac{x}{2}$ .

I have

I have added this last series,  $x - x + x - x$ , &c. because it has lately been the subject of much debate, and I have determined its sum by a different method to others. Mr. Vince is right in calling the sum of this series  $\frac{x}{2}$ , though the method by which he made his deduction was false, and which gave his opponents the opportunity of saying, that the sum of the series might have been  $\frac{x}{3}$ ,  $\frac{x}{4}$ , or  $\frac{x}{\text{any thing}}$  as well as  $\frac{x}{2}$ .

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*On HALOS, by the Rev. JAMES WOOD, A. M.  
Fellow of St. John's College, Cambridge. Commu-  
nicated by Thomas Percival, M.D. F.R.S. &c.*

READ OCTOBER 12, 1787.

**D**IFFERENT hypotheses have been made use of by Des Cartes, Huygens and Newton, to account for the appearance of Halos, or coloured circles, round the sun and moon. The first of these supposes rays of light to be refracted by pieces of ice formed like double convex lenses, which however, he confesses, we never find upon the surface of the earth. Huygens says that halos are caused by small globules of snow, surrounded each by a shell of water; the  
rays



Fig. 1

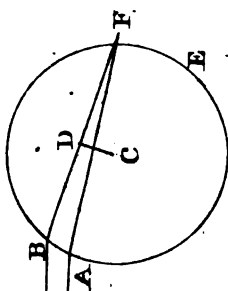


Fig. 2

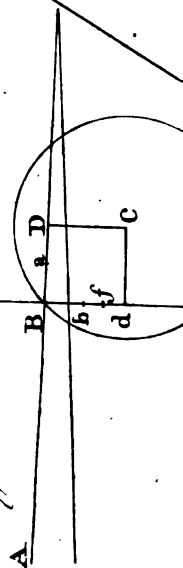
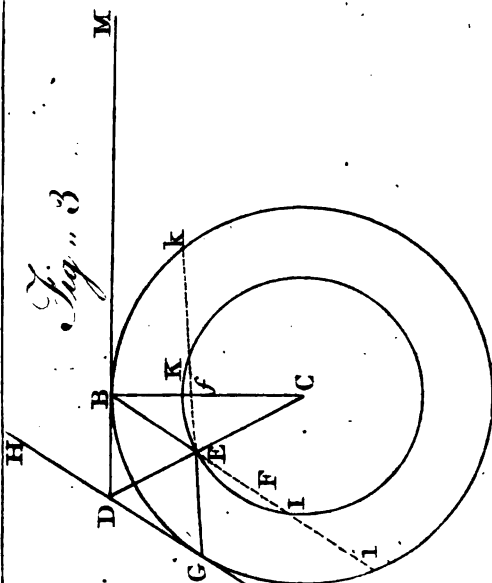


Fig. 3





rays which fall upon the snow being stopped, whilst those which fall on the water are refracted into their respective colours. Newton accounts for the appearance, by supposing that rays of light, in passing through globules of water, are sometimes in a disposition to be reflected, and sometimes to be refracted. All these suppositions however seem to be unsatisfactory, as the rays will not fall upon the eye in sufficiently strong pencils.

The order of the colours in these crowns, as laid down by Des Cartes and Huygens, is contrary to that which Sir Isaac Newton gives.

If they judged from such as are commonly seen round the moon, they might easily be deceived, as the colours are in general not very distinct: the halos I have observed have uniformly been similar to those described by Newton, at the end of his second book of optics.

Cambridge, Nov. 30, 1786. Three very brilliant halos appeared round the moon: the order of the colours, beginning from the moon, was, white of considerable breadth, yellow, orange, red; violet, green, yellowish, red; violet, green, yellowish, red. The red of a fourth was so faint as to be scarcely visible. The radii of these rings might be about one, two, and three degrees, but they were not measured. The red and violet in each case seemed contiguous.

Dec. 2d. A single halo appeared round the moon: its diameter was about  $2\frac{1}{2}^{\circ}$ , and the

Z . . . colours

colours, as in the first of those mentioned above; the red of a second was just seen, and its diameter, as far as could be determined by the naked eye, was double the diameter of the first. In attempting to account for these appearances it will be necessary to lay down the following Lemmas.

LEM. I. A ray of red light cannot pass out of water into air if the ang. of incidence exceed  $48^{\circ} 35' 26''$ . Nor a violet ray, if that ang. exceed  $47^{\circ} 59' 53''$ .

LEM. II. If a small pencil of parallel rays fall upon a spherule of water ABE (fig. 1.) and CD be drawn perpendicular to the refracted rays, they will converge to a point F, which is found by taking  $FB : FD :: \text{tang. of incid.} : \text{tang. of refraction}$ .

Cor. 1. Let the angle of incidence approximate to a right angle, and the tangent of incid. will ultimately be indefinitely greater than the tangent of refraction, and consequently F will coincide with D.

Cor. 2. If a small pencil of rays diverging from D be incident the contrary way, they will be refracted parallel.

LEM. III. Let a small pencil of rays fall upon the convex spherical reflector BFG (fig. 2.) converging to F; from C its centre draw CD perpendicular to BF, and CD to Bf the direction of the reflected ray produced back; bisect BD, Bd in *a* and *b*, and take  $Fa : aB :: Bb : bf$ : the rays after reflection will diverge from *f*.

Cor.

Cor. 1. If the rays converge to D they will, after reflection, diverge from  $f$ .

Cor. 2. In the same manner, if the rays diverge from D upon the concave side of the reflector, they will after reflection converge to  $d$ .

For the truth of these lemmas vid. Smith's Optics, book II. ch. 9.

Let us suppose now with Dr. Halley that vapour consists of hollow spherules of water, filled with an elastic fluid; and let  $BGi$  (fig. 3.) represent such a shell. Take C its centre, and suppose MB to be a small pencil of parallel homogeneous rays, whose angle of incid. is nearly  $90^\circ$ ; they will be refracted to F the middle point of the chord  $Bi$  or  $Ei$ , (Lem. II. Cor. 1.) and since the ang.  $BED$  is greater than  $EBC$ , or  $48^\circ 36'$ , they fall at E upon a convex spherical reflector converging to the middle of the chord  $Ei$ ; making then the ang.  $DEG =$  to the angle  $DEB$  they will after reflection diverge from  $f$ , the middle point of  $EK$  or  $Gk$  (Lem. III. Cor. 1.) they will therefore be refracted at G in the direction of the tang.  $GO$ , and parallel to each other; and if an eye be placed any where in  $GO$ , they will excite the idea of their proper colour. From O draw  $OM$  parallel to  $BM$ , and suppose the whole figure to revolve round  $OM$  as an axis, all the particles which touch the surface described by  $OG$  will refract to the eye a small pencil of parallel rays of the same colour.

The apparent semidiameter of this ring is measured by the angle GOM or HDB = to the angle BCG or 2 the angle BCE ; and if the radii CB, CE, remain the same, the greater the angle EBC the greater will be the angle BCE ; and therefore the greater the semidiameter of the ring; consequently, the red rays will be refracted to the eye from the outermost drops, and the violet from the innermost, and rays of an intermediate degree of refrangibility from the intermediate ones.

The rays which do not pass out of the water at G (fig. 4.) will be reflected converging to the middle of the chord GL or IN (Lem. III. Cor. 2.) and as before, will be reflected at I, diverging from the middle of the chord Ip or KP, and those which pass out at K will be refracted in the direction of the tang. KO, parallel to each other. Thus a second ring may be formed, and because the angle BCK is double of the angle BCG, the apparent semidiameter of this ring will be double that of the former, which being true of every other ring of a given colour, the order of the colours in the second halo must be the same as in the first. In the same manner may a third and fourth be formed at equal distances from the preceding ones, in which the order of the colours will be the same, but the brightness less.

Having given the proportion of the radii CB, CE (fig. 3.) the diameter of the halo may be found :

found : Rad. : S. of the angle CBE :: S. of incid.  
: S. of refraction; and CE : CB :: S. of the angle  
CBE : S. of the angle BEC, and the angles CBE,  
CEB being known, the angle BCE is known, which  
measures  $\frac{1}{2}$  of the diameter. And the converse.

The greatest halo will be formed when BE  
touches the interior surface EI: in this case the  
angle at E is a right angle; therefore the angle  
 $BCE = 90^\circ - 48^\circ 36' = 41^\circ 24'$ , and the appa-  
rent semidiameter  $82^\circ 48'$ . Also CB : CE ::  
rad : S. of the angle CBE :: S. of the angle incid.  
: S. of the angle of refraction.

If we calculate the angle BCE for the red  
and violet rays, and to twice the difference of  
these angles add the moon's apparent diameter,  
we get the breadth of the halo.

Ex. If we suppose the radius of the halo to  
its outermost edge  $1^\circ$ , CE : CB ::  $\frac{81 \times \text{rad.}}{108}$   
: S. of the angle BED :: 75 : 75.57086 :: 131  
: 132 nearly, and the angle BCE for the violet  
rays will be about  $29^\circ 10''$ ; consequently, the  
breadth of the colours will be  $1^\circ 40'$  + apparent  
diameter of the moon. Hence it appears that the  
rad. of the first halo, mentioned above, could  
not much exceed  $30'$  if there were no interval  
between the red and succeeding violet.

If from the same point in the luminous body  
M (fig. 5.) tangents, MA, MF, be drawn to  
the surfaces AB, FD, all the rays which fall be-

tween MA and MF will be reflected by the surface FD; for,  $\text{rad.} : S \text{ of the angle } CBF :: CB : CF :: CB : CD$  (BD being the direction of MB after refraction)  $:: S. \text{ of the angle } CDB : S. \text{ of the angle } CBD :: S. \text{ of the angle } EDB : S. \text{ of the angle } CBD :: S. \text{ of the angle } CBF = \text{rad.} \times \frac{S. \text{ of the angle } CBD}{S. \text{ of the angle } EDB}$  but S. of the angle

$CBF : S. \text{ of the angle } CBD :: S. \text{ of incid.} : S. \text{ of refract.}$  hence  $\frac{\text{rad.} \times S. \text{ of the angle } CBD}{S. \text{ of the angle } EDB} : S. \text{ of}$

the angle CBD  $:: S. \text{ of incid.} : S. \text{ of refract.}$  or  $\text{rad.} : S. \text{ of the angle } EDB :: S. \text{ of incid.} : S. \text{ of refract.}$  Consequently, the angle EDB is the least angle of incidence on the second surface that the rays can have, and be reflected.

These rays will be emergent in different directions, and the nearer they are to MB (fig. 3.) the less will be the inclination of those in the same pencil to each other and to GO. Hence it appears that the less refrangible rays will be nearly parallel to the more refrangible effectual rays which come from the same drop, and by a mixture of the different colours, may be produced the whiteness in the interior part of the first halo. These rays will be too much dispersed to produce any effect in the second and third.

It may easily be conceived, from the manner in which Sir Isaac Newton has expressed himself, that had the diameters of the halos he mentions been



been accurately measured, they would have agreed sufficiently well with this theory. It is not however considered as free from objections, but by future observations must its truth or fallacy be ascertained: should it be found to agree with such observations, it may throw some light on the doctrine of the ascent of vapours, a matter hitherto so much disputed.

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CONSIDERATIONS *relative to the NATURE of WOOL, SILK, and COTTON, as OBJECTS of the ART of DYING; on the various PREPARATIONS, and MORDANTS, requisite for these different SUBSTANCES; and on the NATURE and PROPERTIES of COLOURING MATTER. Together with some OBSERVATIONS on the THEORY of DYING in general, and particularly the TURKEY RED; by* THOMAS HENRY, F.R.S. *and of the Amer. Philos. Society, held at Philadelphia.*

## PART FIRST.

READ DECEMBER 20, 1786.

**I**N the following Memoir, on a subject to which too little attention has been directed by English writers, my principal intention is to present, at one view, the preparatory and other

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processes

processes for the dying of wool, silk, and cotton, and to endeavour to deduce a theory better suited to account for the results, than has hitherto been advanced. In the execution of this undertaking it will be necessary to repeat several things from Hellot, Macquer, and d'Apligny, who have written separate treatises on the dying of these materials; and I am to confess great obligations to that very celebrated chemist M. Berthollet, whose researches are, every day, affording new and important information in the several departments of the hermetic art.

The art of dying, or of imparting to different materials, employed for the fabrication of garments and furniture, those beautiful colours which are afforded by many articles of the vegetable, animal, and mineral kingdoms, appears to have been of high antiquity\*. As most of these materials are, of themselves, either of dark and disagreeable colours, or else devoid of all colour, it is probable, that, even in the very earliest ages, the love of ornament, which is natural to mankind, would induce them to stain their vestments with various colouring ingredients, especially with vegetable juices. But the art of imparting *permanent* dyes to cloth, and affixing to its fibres such colouring materials, as could not easily be washed out by water, or obliterated

\* Delaval on Light and Colours.

or greatly changed by the action of air, or of certain saline substances, to which they are liable to be exposed, and which are necessary to render them clean, when soiled ;—this was an art which required the knowledge of principles not within the reach of untutored men, and only to be obtained by gradual investigation, and in long process of time.

It has been proved by our ingenious associate, Mr Delaval, that the Egyptians were possessed of the art of dying, and even of that of printing on cloths. In a passage, which he has quoted from Pliny, that author relates that the Egyptians having besmeared, or drawn on white cloth, with various substances, which were in themselves colourless, but capable of absorbing colouring matter, threw them into a caldron of hot liquor, tinged with dying materials; and that, though the parts, thus drawn upon, were not distinguishable, before the cloth was immersed in the colouring liquor, and though this liquor contained only *one* colour, it was surprizing to see the cloth taken out, stained with several different colours, according as the different parts of it had been impregnated with the various substances, capable of receiving and altering the nature of the pigment.

This is so plain a description of the art of what is now called callico printing, that though it is my intention to refer those gentlemen, who wish to be more intimately acquainted with the ancient history

history of dying, to that written by Mr. Delaval, and prefixed to his ingenious treatise on light and colours, yet I could not refrain from relating it on this occasion.

Permit me also to mention another historical fact from the ancient history of this art. The Phœnicians held a decided pre-eminence in the tinctorian art, for many ages: their purple and scarlet cloths were sought after by every civilized nation, and the city of Tyre, enriched by its commerce, increased to an amazing extent. But her career was stopped by the vanity and folly of the Eastern emperors; under whose dominion, this opulent city had unfortunately fallen. Desirous of monopolising the wearing of the beautiful cloths of Tyre, these misjudging tyrants issued most severe edicts, prohibiting any one from appearing in the Tyrian blue, purple, or scarlet, except themselves, and their great officers of state. The enacting and enforcing of sumptuary laws requires great judgment, and delicacy; and much caution should be used, lest, in curbing excessive luxury, the arts, which are supported by its moderate indulgence, should be destroyed. Such however was the fate of the Tyrian dyes. Under the impolitic restraint imposed on the consumption of the Phœnician cloths, the manufacturers and dyers were no longer able to carry on their trade, it grew languid,

guid, sickened, and expired: and, with the trade, the art likewise perished.

This example of the interference of government, so materially injuring, and even annihilating an useful art, and the commerce depending on it, though carried to an excess, never likely to be imitated in these days, should make ministers cautious that they do not form laws which may discourage or fetter our manufactures. For freedom is the very soul of trade; and, in proportion as the one is invaded, the other will certainly decline.

In this nation, the art of dying had made no considerable progress till about the beginning of the last century\*. Before that period, our cloths were sent to Holland, to be dressed and dyed. Probably however this was practised only in the case of particular colours; for it appears that the dyers of London received their charter of incorporation from Henry the sixth. My friend Mr. Charles Taylor has put into my hands a small tract, entitled, *A profitable book declaring dyvers approved remedies, to take out spots and stainses, in filkes, velvets, linen, and woollen clothes. With divers colours how to die velvets and filkes, linen and woollen fustian and threade. Also to dress leather and to colour felles &c. &c. very necessarie for all men, especially for those who bath or shall have any doings*

\* Chamber's Cyclopædia, article Dying.

348 *Mr. Henry's Considerations on different Materials,*  
*therein: with a perfect table thereto, to find all things*  
*ready, not the like reveled in English heretofore.*  
*Taken out of Dutche, and Englished by L. M. imprinted*  
*at London by Thomas Parfoot, dwelling in the new*  
*rents. 1596.* This little book, published at so  
early a period, contains many good processes;  
and it is to be lamented, that during so long a  
lapse of time, the English nation has not produ-  
ced any work, on this subject, that I know of,  
much superior to it. The mode of computing  
the length of time, employed in many of the  
processes contained in this publication is curious.  
The immersion of the subject in the dying  
liquor is, in general, ordered to be continued,  
not for so many minutes, but for five, six, or  
seven *Pater-nosters* long.

The dying of woollen and silken goods has  
long since attained a considerable degree of ex-  
cellence, while the manufactures of cotton, owing  
to the small attraction of that substance for colour-  
ing matter, have been very deficient in this  
point. Till within these few years, the colours  
employed in the dying of fustians and cotton vel-  
vets were few; and, even at this day, many of  
them are fugitive. But it must be allowed that  
great improvements have been made, within  
these few years; improvements principally ow-  
ing to the ingenuity and public spirit of Mr.  
Wilson, of this society; who by the application  
of chemical principles, and by a diligent investi-  
gation

gation of the nature of colouring substances, laid the foundation on which the present fabric is erected.

Much room is however still left for the improvement of the art, and I am convinced that it is only by our practical dyers acquiring chemical knowledge, that it can ever be effected, to any great extent. While men do not understand the grounds on which they should proceed, many errors must arise, many needless materials must be employed, and much expence, which might be spared, must be incurred. To promote this desirable end, I shall, with the permission of this Society, lay before them, not only such information, as I have extracted from the best writers on the subject, but such facts as I have been able to collect, and observations which I have had opportunities of making, tending to form a just theory of dying; and especially of those processes where mordants are employed.

The variety which obtains in the facility with which animal and vegetable substances attract colouring matter is a curious subject for investigation. It is known that some colouring ingredients which are most readily imbibed, and tenaciously held, by wool, have much less effect on silk, and are either wholly rejected, or very slightly attached to, cotton or linen. Different preparations and mordants, applied under differ-

ent

ent circumstances, are requisite for these several materials. M. du Fay's experiment, which he made before the Royal Academy of Sciences, has been so often related, that I shall not quote the particulars. Let us rather refer to the theories which have been advanced to account for these phenomena; inquire how far they appear to be founded on truth; and give the chemical analyses of the various substances, which may perhaps serve to throw some new light on the subject.

These phenomena have been variously explained. Some have attributed the variety in the power of the several substances to retain the dying ingredients applied to them, to the different structure of their filaments; to the porosity of wool, and to the impenetrability of cotton and linen\*; at least, to the latter possessing pores of much inferior dimensions; silk being supposed to hold a middle rank. Wool, say these theorists, is composed of numerous filaments, similar to hairs, and like them consisting of tubes, containing a medullary or oily matter. The sides of these tubes are also perforated with an infinite number of small orifices, communicating with the longitudinal canal. From this mechanism, it is excellently adapted for receiving extraneous bodies, which are not only capable of

\* Le Pileur d'Apligny Art de la Teinture des fils, & étoffes de Coton.

being



being applied to the superficial pores of the filaments, but even of penetrating into the interior structure of the tubes, when divested of the medulla they naturally contain.

Silk is described, by these writers, as a glutinous liquor, formed in, and excreted from, the body of the silk worm, who spins it into a kind of thread, which hardens on exposure to the air. An operation which is facilitated by another substance, analogous to wax, which the worm also secretes, and with which the surface of the filament is varnished. This thread being formed by a continued series of the dried glutinous particles, in the act of drying many pores must be formed on its surface. But these pores are superficial; and the thread not containing a longitudinal canal, is therefore incapable of admitting any but minutely divided particles, and those in very limited quantities: and as these particles cannot penetrate deeply into the substance of the silk, they require, for their confinement, some addition, which shall more strongly agglutinate them than is necessary for the dying of wool. Hence the difficulty of attaching permanent colours to silk; and hence the greater waste of the dying materials: for as only the finest particles can be admitted into the pores, the remainder is lost.

Cotton is represented as a filamentous substance enveloping the seed of the cotton plant. The

filaments

filaments are said to be tubular, and, like wool, to have exterior lateral pores, communicating with the longitudinal tubes. These are much smaller than those of wool, and are filled with an unctuous matter, of which they must be deprived, before they can be penetrated by the particles of the dyeing materials. This matter is difficult of solution, and hence, and from the minuteness of the tubes, arises the labour requisite to complete the dyeing of cotton. That it really contains this unctuous substance is evident, they add, from the slow manner in which cotton imbibes water, previous to its being prepared or scoured, and from its increased power of absorption, subsequent to that operation; by which also, though opaque before, it is rendered clear and transparent.

Linen, in the state of flax, is probably also porous; but its pores being smaller than those of the other substances; and being of a more compact texture, they admit, with more difficulty, the tinging particles, especially those of the good dye. The particles of the false dye, however, find pretty easy admittance. But, when the flax is spun, a number of accidental pores are formed in the thread, into which the particles of the greater or true dye may enter, and be better retained than in the flax. And for this reason the *twisted* thread takes a better colour than either the flax, or *single* thread.

If

If we allow of the authenticity of the above facts, they will certainly account, in a satisfactory manner, for the different effects produced, by the same tinging materials, on subjects composed of wool, to those produced on silk, cotton or linen. If they be all porous, and the dimensions of the pores of each be different, the substance, which has the largest pores, will be capable of receiving a much greater portion of tinging matter, than that which has the smallest. It may seem some confirmation of this theory that cloths, woven in various modes, are said to receive colour, more or less freely, according to their texture. But perhaps the various shades, observable in these cases, may proceed from some circumstances, in the reflection and transmission of the rays of light, arising from the alteration in the position of the reflecting and transmitting bodies.

To this theory it has been objected, and with much appearance of reason,\* that the colouring matter is not merely insinuated into the pores of the substance to be dyed, but becomes firmly attached to it; and, that the more numerous and large the pores are, the more of the colouring matter should be absorbed, and, as it were hidden, within them; whereas wool, which is supposed to contain pores, more numerous and

large than those of silk, receives an equally brilliant crimson, from two parts of cochineal, as is produced by five parts, on silk; both subjects being prepared in the same manner, by aluming. And this, not because the silk rejects any of the colouring particles of the cochineal; for the liquor is equally exhausted of colour, in one case as in the other; but, it should seem, that silk can absorb much more colouring matter, and yet is much less easily dyed, than wool. It is therefore more probable that dying is a mere application of colouring matter to the fibres of the materials to be dyed, aided by a chemical attraction between these substances; and that the entrance of the colour into the pores of the cloth, &c. is an ill founded hypothesis.

But is it not probable, admitting that a different mechanism may exist in the structure of these substances, that there may, also, be a difference in the nature of their constituent or proximate principles, which may vary the force of their attraction for the tinging matter, or for those substances which are used as bases for that matter to adhere to; into the nature of which we shall hereafter examine? Neuman analysed, by fire, wool, silk, and cotton; and he found them to consist of proximate principles, differing in each, from those of the others\*.

\* Neuman's Chemistry by Lewis, vol. II.

From one pound, avoirdupois, of wool, he obtained by distillation, one ounce, six drachms of volatile alkaline salt, seven ounces of ~~nitrous~~<sup>urinous</sup> spirit, and two ounces and half of empyreumatic oil. The caput mortuum weighed three ounces, six drachms, of which two drachms were dissipated by calcination.

Silk yielded, from a similar weight, nine ounces of mixed matter, consisting of four ounces, two drachms of urinous spirit; three ounces, six drachms of volatile salt, and one ounce of empyreumatic oil. The residuum weighed seven ounces; lost one ounce on calcination, and then afforded, to water, forty grains of fixed saline matter.

Cotton did not yield the same foetid smell as wool, when burned in the open air, nor any urinous salt or spirit in close vessels. A pound, avoirdupois, of cotton gave over, on distillation, seven ounces of an acidulous, fuliginous, oily spirit, and about ten drachms of an empyreumatic oil. The remaining coal was reduced, by calcination in a crucible, to eight scruples of white ashes, which afforded a small portion of fixed alkali. Monsieur Berthollet, a very ingenious French chemist, has lately analysed these substances in a different manner.\*

On distilling silk with nitrous acid, he obtained saccharine acid, and a greasy matter; which,

\* Journal de Physique, vol. XXIX. part II.

though it at first congealed on the surface of the liquor in the receiver, was afterwards dissolved in it, by means of heat, even though diluted with water, with which it passed through the filter. Wool also afforded the same greasy matter, and acid of sugar; the latter in much larger portion than any other substance which he treated in the same manner. But the oil of vegetable substances was entirely destroyed by this treatment, no greasy matter being produced; and, on analysing cotton, he procured saccharine acid, but no other product; and the quantity of that acid was far inferior to that yielded by animal substances.\*

It should appear, then, that there is a considerable difference between the constituent parts of animal and vegetable substances. Animal

\* M. Berthollet found the portion of saccharine acid, yielded by cotton to be very small indeed; nor did he find any other residuum, in the retort, or any thing but the pure nitrous acid, in the receiver. Almost the whole, therefore, of this vegetable matter, seems to have been changed from a solid, to an aerial form, and to have been dissipated as gas; a state to which the saccharine acid is also easily reducible. Thus, says he, probably, are the most solid bodies convertible into elastic vapours, as on the other hand, the most compact substances in nature may be formed by the union of different gases.

The saccharine acid was first discovered by Bergman, in sugar, but is obtainable from many other substances both animal and vegetable, which contain its basis, particularly from galls, which yield it in great abundance.

substances

substances contain much more oil than vegetable ones, and this oil is soluble in water, which the vegetable oil is not. The animal oil, on distillation yields an alkaline; the vegetable, an acid, liquor. On the different properties of these oils, the distinction between the nature of animal and vegetable substances seems chiefly to depend. It is to be remarked, in the analysis of wool by M. Berthollet, that though animal substances yield much volatile alkali on distillation, no nitrous ammoniac was formed in his process; which might have been expected, had the alkali been previously contained in the wool. This fact favours the opinion that the volatile alkali is formed during the process of distillation. It is at least probable that the alkali is so combined in animal bodies, as to require the aid of heat to free it from those substances, which neutralise or conceal it. Or, as we know that there is a strong resemblance between volatile alkali and the inflammable principle, may we not suppose that this principle may be forced by heat, into combination with the animal acid, and the alkali be, thus, created\*? Vegetables yield but

\* M. Berthollet has since proved the volatile alkali to be formed by the union of inflammable with phlogisticated gas; and that it does not exist in animal substances, previous to their distillation or putrefaction. The effects therefore that have been ascribed to the supposed volatile alkali of these substances, in the processes of dying, must depend on some other cause.

little of this volatile alkali, but much acid liquor.

It may be added, that vegetable substances, whose oil is wholly destroyed by nitrous acid, and to whose texture the mineral acids, in general, are highly injurious, bear steeping in solutions of caustic alkali, of such strength, as would prove totally destructive to wool.

How far these varieties, in the component parts of animal and vegetable substances, may influence their power of attracting colouring matter, I do not pretend to determine, but the propriety of a different previous treatment, seems clearly deducible from it.

Wool has naturally so strong an attraction for colouring matter as to need but little preparation, previous to the more immediate processes of dying; and it is only necessary to scour it from a greasy or fatty substance, called the yolk, which is contained in the fleece. For this purpose an alkaline liquor is necessary; but as alkalis injure the texture of the wool, it is requisite that a very dilute solution be employed; for were the quantity of salt greater than is sufficient for converting the yolk into a soap, it would attack the substance of the wool. Putrid urine, therefore, is generally used, as being cheap, and containing a volatile alkaline salt, which, uniting with the greasy matter, renders it soluble into water.\*

\* *Hellot Art de la Teinture des Laines, &c.*



Silk, when taken from the cone, is covered with a kind of varnish, which makes it feel rough and hard to the touch, tarnishes its whiteness, and is generally said to be of such a nature, as to be neither soluble in water, nor in spirit of wine. It has been thought that the only solvent for this substance is a solution of alkaline salt; and this is commonly applied in the form of soap. The soap should always be of the best quality; for inferior soaps, especially those made with animal fat, are not only less powerful in their action, but apt to stain or discolour the silk. The silk in this operation loses about  $\frac{1}{4}$  of its weight. The matter separated from it is highly putrescent; for if a hank of silk which has been thus treated, be not washed, after the operation, it will, in a few days, grow hot, stink, and be covered with small white worms, which feed on the soapy and glutinous matter remaining in the silk. The liquor in which it has been boiled also soon putrifies, and becomes useless. Could this animal matter, says M. Macquer, be precipitated from the soap, before putrefaction takes place, the soap might be recovered, and thus, a considerable saving made to the dyer.\*

The use of the best soaps has been recommended; but even these are suspected of being detrimental to the whiteness of the silk; and the Chinese silks, which exceed the European in

\* Macquer *Art de la Teinture en Soie.*

lustre, are said to be prepared without soap. The French Academy, therefore, some years ago, offered a prize for the discovery of a method of cleaning silk, without soap; and the prize was obtained by M. Rigaut, whose mode was to use a slender alkaline solution instead of soap.

But Mons. l'Abbe Cullomb\* has lately gone farther, and has actually dissolved in water, the varnish of silk, which has always been supposed to be of that oleo-resinous kind, as not to be acted on even by spirit of wine. He exposed a quantity of raw silk to the action of boiling water, for nine hours, and found it freed from the varnish, with the loss of one fourth of its weight.

Though the silk, by these means, acquires a considerable degree of whiteness; if intended to receive some of the most brilliant colours, a farther operation is requisite. This consists in exposing the silk to the fumes of burning sulphur, so confined in a stove, that none shall escape, but the whole be applied to the material intended to be whitened. Of the rationale of this operation Mr. Delaval has given a very ingenious explanation. †

But, though thus rendered more fit for exhibiting the brilliant colours, the attraction of the silk, for colouring matter is rather diminished

\* Journal de Physique, part II. vol. XXIX.

† Manchester Memoirs, vol. II. p. 2.

than increased. The raw or unscoured silk being more easily and permanently dyed, than that which has passed the above described process.

Cotton and linen are prepared, for the purposes of dying, by boiling in solutions of alkaline salts, and afterwards exposing to the air and sun's rays, in the bleach field. Linen, containing much oily and resinous matter, requires a strong solution of alkaline salts, and that they be in a caustic state; but cotton, not having any resinous matter, and not much superabundant oil, the milder alkalis are more beneficially employed for the bleaching of it.\*

This bleaching, or steeping in the alkaline leys, leaves in the cotton, however well washed, some earthy matter, which being unequally distributed, would, when the cotton is to be dyed, render the application of the colour unequal. This therefore is to be removed by steeping in a dilute vitriolic acid, which is capable of dissolving and carrying off the earth. But this acid is

\* The new mode of bleaching, by means of the dephlogisticated marine acid, which has been introduced into our manufactures since the reading of this paper, promises to be of great utility to them, not only by shortening the time required for the process, which has been generally extended from one to two months, but may now be reduced to a few hours; but by sending up the goods in a state much better adapted to the subsequent processes.

also

also to be carefully removed by washing the cloth in water: otherwise, as it becomes dry, the acid, being gradually concentrated by the evaporation of the water, will attack and corrode the cotton.

The intention of these previous preparations seems to be two fold. The first is to free the material, to be dyed, from any extraneous matter, which might, by its want of attraction for water, prevent the absorption of the colouring liquor. For we find that unbleached stuffs do not imbibe water, with near so much avidity as those that have been bleached. The second is, that the yarn or cloth may be rendered whiter, and, by reflecting the rays of light, more copiously, enable the colouring matter to exhibit more brilliant tints; and, to these, a third intention has been added, viz. to enlarge or dilate the pores of the substance.

But, for some particular purposes, cotton requires a different and more complex preparation. In the process for dyeing the Turkey or Adrianople red, it is boiled, and repeatedly steeped, in mixtures of mineral alkali, oil, and animal excrement,—and, though these operations have been considered as only answering the above described purposes, I trust I shall be able to make it appear, in the sequel of this paper, that important additions are thus made to the cotton, whereby its attraction for colouring matter is increased.

Having

Having thus considered the natures of the different subjects of dying, and the various preparations necessary for fitting them for the reception of colouring matter, in general. Let us next proceed to some description of the colouring substances which are employed in dying.

These are divided into two classes, viz. those which are themselves possessed of colour; and those, which possessing no colour in themselves, alter the power of the former to transmit the various rays of light; thereby enabling them to exhibit colours different from those which they would naturally exhibit.

When I say that substances do themselves possess colour, I only mean, that they possess the power of transmitting particular rays of light; so as to produce, by the action of these rays on the retina, the idea of certain colours.

Though the primitive colours, into which a ray of light may be divided, are seven; yet the original colours produced by dyers are no more than five, viz. blue, red, yellow, brown and black. From these, perhaps, the two last may be excluded as compounds. All the other shades, of various denominations, are formed by different combinations of these original colours.

The substances which do, themselves, contain colouring matter, and are used in dying, are chiefly of the vegetable, some of the animal, and, in a few instances, of the mineral kingdom.

The

The last consist of metallic calces, and chiefly those of iron and copper.

Of the two former\*, most of their component parts, in which the colouring matter resides, such as their mucilage, their gum, and the salts which they contain, are soluble in water; as, by means of these salts, are also their oily parts. To these the French writers have given the general name of extractive soapy matter. Other constituent parts of vegetables are not soluble in water, as some of their oily, their resinous, and their earthy parts.

Yet we should be deceived, as M. Macquer justly observes, if we were to expect to make a perfect separation, by means of water, of the extractive soapy matter from the other parts. For, a portion of that matter is defended from the action of the water, by the resinous and oily substances; while, on the other hand, these are partially dissolved, being rendered capable of uniting to the water, by means of the mucilaginous parts.

The colouring animal and vegetable drugs of the *materia tinctoria* have been formed by chemistry into three divisions†.

1st. Those substances, which, together with extractive, contain some resinous, and also, some portion of earthy, matter in their com-

\* Macquer Dictionnaire de Chymie.

† Ibid.

position: and the colouring principle, having a strong attraction to the earth, and this to the substance to be dyed, a separation from the water is easily effected, and the colour is capable of being applied, and of adhering, in a durable manner, without the intervention of any medium. Of this tribe are galls, walnut rinds, and the root of the tree, sumach, and alder bark; and these are called root colours, as being the foundation of others.

2dly. Other articles of the *materia tinctoria* consist of such materials, whose parts are either wholly extractive, or, though containing some resinous matter, are capable of being dissolved in water alone; and being deficient in the earthy principle, contained in the articles of the former division, require that an earth be previously introduced into the pores or interstices of the substance, intended to be dyed; to form a basis, to which the colour may adhere. Without this medium the attraction of that substance to the colouring matter would be so weak as either not to be able to separate it from the water; or, if separated, to retain and prevent it being redissolved by the water, when aided by mechanical means, or the addition of certain substances which increase its solvent powers, even in a small degree\*.

3dly.

\* Many of these colouring bodies, as well as those of the first division, also contain a principle, known by the appellation

3dly, Another class consists of principles so prevalently resinous, that we are obliged to promote their solution in water, by fermentation or by the addition of some substance, which may act on the resinous particles. For this purpose alkaline salts or quicklime are employed; and by their means we extract the colouring matter of some bodies, such as indigo, archil, safflower and annatto. These also attach themselves to the cloth, without the intervention of an earthy medium.

But, the degree of fixity is various in the different articles of the *materia tinctoria* belonging to all these divisions. Some of them belong to the lesser or false dye, as it is called, and are liable to be injured, and even destroyed, by the action of the sun's rays, air, water, and alkaline or acid liquors. The ingredients of the good dye, on the contrary, in a great measure withstand the influence of these agents.

appellation of the astringent principle, which greatly contributes to their fixity, and has much effect in separating the earthy parts of the salt employed to afford the above-mentioned basis. Under this description are comprehended, cochineal, madder, weld, quercetron bark and several other drags. But other articles of this division seem to be either deficient in this principle, or else to possess it of so volatile a nature, that it readily escapes, and carries, along with it, the colouring matter, to which it has a close attachment. Of the nature of this principle, we shall hereafter give a more particular detail.

The



The former are more easily managed, cheaper, and more brilliant; but the latter make amends for their other defects by their solidity and permanency.

The colouring matter itself is formed, perhaps, in a great measure, of the inflammable, ~~and~~, in some cases, united to the astringent, principle. The identity of light and phlogiston, or, at least, that the one is a modification of the other appears to be pretty clearly proved. Plants, totally excluded from the sun's light, acquire no colour; and flowers are observed, *ceteris paribus*, to possess the most beautiful tints, in those climates where they enjoy the influence of that luminary, the most liberally. This matter therefore must of itself be very fugitive, and as phlogistic bodies act on, and dissolve, each other, very powerfully, we are hence enabled to account for the destructive effects of solar light, on colour, when applied to the dead fibre, from its dissolving the phlogiston, in the same manner, according to Mr. Delaval, as spirit of wine dissolves camphor.\*

The acids also act on, and destroy, colouring matter, in proportion to their attraction for phlogiston. Thus nitrous acid is highly and instantaneously destructive to many colours: but is exceeded, in power, by the dephlogisticated marine acid. This very active substance is the strongest test of all others for the goodness of  
dyes

\* Manchester Memoirs, vol. II.

dyes ; for, those that can withstand its action, will endure every other hardship without injury.

Again, some chemists have considered iron, as the colouring matter of vegetables, as it certainly is, in many instances, of minerals. But this theory does not necessarily exclude phlogiston. For it is supposed that the various colours which plants exhibit, may depend on the various states of *phlogistication* in which the iron exists. Thus iron, when dissolved in vitriolic acid, is green. Apply such a degree of heat, as may drive off a part of the remaining inflammable principle, and the acid, it becomes yellow; and, on carrying the process still farther, it descends farther to red, and purple. It must be allowed that iron enters as a component part into most plants: and that its calces are capable of exhibiting great variety of colours. But still it is to phlogiston or light, that we are to look up as the real cause of colour; this being the active, while the martial calces, can, at most, be regarded as the passive principle.

Since the formation of the antiphlogistian theory, indeed, by which the existence of phlogiston is denied, the various colours of plants have been accounted for, from the different proportions of dephlogisticated air, they may retain. Plants, when exposed to the action of the sun's rays, have their water decomposed and part with this pure air, yielding it in proportion to the  
quantity

quantity of light they receive, and which, joining with it, gives it elasticity. But plants, kept in the dark, throw out none of this air, and are white. Those of the same kind, exposed to a weak light, will have some of the air separated, and have a faint degree of colour; and those, which undergo the action of a strong light, will exhibit vivid tints. But though we allow of the dephlogisticated air as producing whiteness, yet we may also acknowledge the effect of phlogiston in producing colour; and, in fact, the antiphlogistians are obliged to admit of inflammable gas as a substitute for it; and, to acknowledge, that this gas, which they suppose to be the other constituent part of water, is the principle of colour\*.

The colourless ingredients used in dying consist of alkaline, acid, nitrous, earthy, and metallic; salts, which contribute either to extract the colouring matter, from other substances which contain it; or, by either attenuating or increasing its particles, to cause the colour to ascend or descend, according to the prismatic range. Thus, acids raise the blue colour of vegetable juices to indigo, violet, red, and yellow, while alkalis reduce the tints, thus raised, to violet, indigo, blue, and; on a farther addition, to green.

\* Journal de Physique, tome XXVI. part I.

In the subsequent part of this paper, we shall proceed to consider the nature of the several bases ; endeavour to deduce a theory of dying ; and, particularly, to account for the action of the substances employed in the preparation for the Turkey red, and in the other parts of that process.

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## PART SECOND.

READ DECEMBER 27, 1786.

**I**N the former part of this Memoir, it must have been evident to the Society, that the processes which have been already described, are founded on chemical principles ; and that a knowledge of chemistry must, consequently, be advantageous to those who have the direction of such operations, and serve to expedite improvements in them. In those which remain for description, the Hermetic Art, is equally useful.—The whole business of dying, is, indeed, so truly a chemical process, or rather a combination of several chemical processes, that I am convinced the invention, or at least the principal improvements, of the fundamental parts, must have proceeded from men skilled in chemistry. We have seen that the Egyptians were even acquainted with the more  
com-

complicated kind of dying, or *callico printing*, and this knowledge was not confined to them, but was possessed by other Eastern nations. From the East also proceeded, *to us*, Chemistry herself; and, it is highly probable that the art was of great antiquity in that part of the globe; and had arrived at a degree of perfection, of which we have at present, no suitable ideas. To have invented the process of printing, in the manner described by Pliny, the inhabitants of India must, probably have known how to prepare alum\*, they must have been acquainted with the manner of dissolving lead in the vegetable acid; they must, at least, have been acquainted with the component parts of these salts; and they must have had a knowledge of double elective attractions.

In our division of the various colouring substances, of the animal and vegetable kinds, we took notice that there are some, viz. those of the third division, which not having, of themselves, a sufficient attraction for the cloth, require to have an earthy substance applied as an intermedium. The requisites in this earth are, that it should have a strong attraction for the material to be dyed, and also for the colouring

\* The fastitious salt, which is now called alum, was first discovered in the Eastern countries; but when, where, and by what means, is unknown.

Bergman's Essays, vol. I. p. 339. E. transl.

principle; and, in many cases, that it should possess perfect whiteness, for the purpose of reflecting the rays of light, so as to enable the tinging matter to exhibit its peculiar colour with the greater brilliancy.—If to these properties, be added, that, though soluble in acids, its solubility should not be too easy, and that it should even be capable of forming insoluble compounds with some other substances, which may be occasionally added to it, for that purpose, we have perhaps a complete description of such a basis, or, as it is commonly called, a mordant.

This is a term, that appears to have been first introduced by the French dyers; who, apprehending that the intension of passing the substances which were to be dyed, through certain saline liquors, the nature of which they did not understand, was to corrode something that opposed the entrance of the colouring principle, and to enlarge the pores of the substances, gave to the liquors, the appellation of mordants.—A term which, as conveying a wrong idea, it is to be wished were rejected. I shall therefore take the liberty to change the word MORDANT for BASIS, adding an epithet occasionally, descriptive of the body, from which it is obtained.

The substances principally used to afford the white bases for colouring matter, are alum, and solutions of tin in different acids, but generally in marine acid, or in a mixture of marine and nitrous acid, commonly known by the name of *aqua regia*.

Alum,

Alum, being a cheap substance, is most commonly used. It consists of vitriolic acid, pure clay\*, or argillaceous earth, and water. According to Bergman, one hundred parts of crystallised alum contain thirty-eight of vitriolic acid, eighteen of clay, and forty-four of water. The clay is generally supersaturated with acid, which is proved by the phenomena produced on the addition of mild, vegetable, fixed, alkali. On the first portions of alkali being added a small portion of the earth precipitates from those parts of the alum with which the alkali comes in contact; and as pure clay has an attraction for aerial acid, the effervescence produced is at first small; but presently the remaining free acid, attacking this precipitate, redissolves it; an effervescence appears, occasioned by the discharge of the aerial acid from the clay. This precipitation, followed by redissolution, and a discharge of gas, continues, till the acid be perfectly saturated; the precipitation then goes on regularly and the earth is no longer dissolved a new, except the alkali be continued to be added, after the precipitation is fully accomplished; nor does any effervescence follow, when fresh portions of alkali are added.

These are the appearances when mild, or aerated, vegetable alkali is used; but if the pure or caustic

\* The constituent parts of common clay are argillaceous, mixed with siliceous earth, in various proportions. Pure argillaceous earth is only obtainable from alum.

alkali be employed, the precipitation takes place more slowly; and if the pure alkali continue to be added, after the precipitation is effected, the earth will be redissolved.

This earth has a strong attraction for colouring matter; particularly for such as forms the red and yellow colours. Inasmuch, that if a solution of alum be poured into water, deeply tinged with madder or weld, the earth will quit its acid to unite with the colouring particles of these substances, and form with them a precipitate or laque; from which it cannot be separated, either by the action of water, or spirit of wine, and which is not even totally destroyed by that of fire.

Marine salt of tin, and that formed by *aqua regia* have, for their basis, the white earth of that metal, which has also a strong attraction for colouring matter, and is, in some cases, preferred to that of alum. When united to the colouring matter of cochineal, it forms a beautiful pigment, well known by the name of carmine. If the addition of these saline substances to the coloured liquors, be sufficiently long continued and under proper circumstances, the whole of the colouring matter will be precipitated, and the water be left colourless\*.

Tin is not the only metal which affords bases for colouring substances. Lead, bismuth and zinc also afford earths or calces, which attract

\* Macquer Dictionnaire de Chymie.

colouring



colouring matter; but the two first have defects which render them less eligible. The calx of zinc may perhaps be usefully employed. But should first be thoroughly purified from the iron which it generally contains.

These all form bases for the more brilliant reds and yellows. For the last, the calx of copper is also employed, having a strong attraction for the colouring matter of weld. Salts containing iron furnish a basis, which, with the astringent matter of vegetables, produces a black dye.

When alum is used to supply a basis for the dying of wool, it is the practice to join with it, either crude tartar or its purified crystals, in the proportion of five ounces of alum, to one of tartar. This last substance we know consists of an alkaline vegetable salt, supersaturated with a peculiar acid, which bears its name. The superabundant vitriolic acid of the alum, will decompose a part of the tartar, by attaching itself to the alkali; and thus the quantity of free tartarous acid is increased; which has no properties injurious to the cloth.

In the aluming of silk, no tartar is employed; for the silk, in the previous preparation, being impregnated with alkaline or soapy matter, the superabundant acid will be neutralised by it. In this process, when the tubs have been long used, a very considerable incrustation is formed on their sides; which, the dyers, finding no injury.

from, suffer to accumulate. Some of the soap, used for the scouring, adheres to the silk, notwithstanding the washing it undergoes, and the alkali of the soap, uniting with the acid of the alum, some of its earth, is precipitated, joins with the detached oil, and forms the incrusting substance; the undecomposed alum, and the vitriolated tartar perhaps also, in part, entering into the combination\*.

Cotton requires a still different treatment—as the vitriolic acid is injurious to cotton, and it is necessary that the aluminous solutions should be well dried on it, before it be washed; the acid, being concentrated, by the evaporation of the water, would corrode the cotton. It is therefore proper to saturate the superabundant acid, previous to the aluming of the cotton; and, for this purpose  $\frac{1}{2}$  or  $\frac{3}{4}$  of pearl ashes is to be added.

But the aluminous liquor, used by the printers, is prepared in a different manner. To three pounds of alum dissolved in a gallon of hot water, a pound and half of sugar of lead is added; the mixture is stirred together for a considerable time, and the agitation repeated often, during two or three days; when a few ounces of whiting are to be added, gradually, as a strong effervescence ensues. On adding the sugar of lead to the alum, a double elective attraction produces two decompositions, and two new compounds. The vitriolic acid forsakes the

\* Macquer, Art de la Teinture de Soie.

the earth of alum to unite with the calx of lead of the *saccharum saturni*; and this new salt, possessing very little solubility, falls to the bottom of the vessel in form of a white precipitate. The earth of alum, being left at liberty, and in so minutely divided a state, is attacked, in the act of precipitation, and dissolved by the acetic acid; which, having united the lead, is ready to form this new alloy, and this a very soluble salt, being the product, is remained dissolved in the water; and, when thickened with gum, is applied by means of blocks to the cloth. The piece being afterwards dried in a hot stove; the vinegar, which is the cloth dries, becomes highly concentrated and very volatile\*, not having a strong attachment to the aluminous earth, flies off and leaves the bath, upon the cloth, ready to receive the colouring matter. And herein consists the advantage of the change of the vitriols for the acetic acid.

Thus we see that the printer's liquor, for the red and yellow colours, is not, as those artists generally imagine, a mixture of alum and sugar of lead, but merely an acetate of allyl or aluminous earth, combined with vinegar. The addition of whiting is intended only to neutralise the

\* The vinegar, by its union to the calx of lead, seems to have acquired some new properties. For on separating it from the lead, by distillation, it always contains some portion of ether. When the cloth has become dry in the hot stove, Mr. Charles Taylor has observed flashes of electric light, darting from its surface.

super-

superabundant acid; and would perhaps be better made to the alum, before the mixture of the sugar of lead. For as that acid immediately precipitates some of the lead, without furnishing the acetous acid with aluminous earth in return, a waste of the *saccharum saturni* is the consequence, which might be prevented by the mode now recommended.

The solutions of tin, and the other white metals, should be as perfectly saturated as possible; otherwise not only the superabundant acid will injure the cloth, but the calx will not so readily precipitate, to form the white basis. In the dying of wool, the solution of tin is mixed with the decoction of cochineal, and falls in the form of carmine on the cloth. But silk has in vain been attempted to be dyed scarlet, in this mode. M. Macquer has however accomplished this desideratum, by first fully impregnating the silk with the solution, before he proceeded to the dying. By this means M. Macquer declares that he has produced scarlet, though not equal to that dyed on wool; yet sufficiently beautiful, and superior to the scarlet formed by a mixture of safflower and arnatto. And, he adds, that an eminent manufacturer at Lyons had succeeded in dying great variety of colours on silk, by applying the tin basis, after the same manner\*.

If a scarlet could be dyed without the use of nitrous acid, the tin basis might be employed for

\* Dictionnaire de Chymie, 2d Edit.

this purpose, on cotton; but that acid being requisite for the production of this beautiful colour, and being highly corrosive to cotton, this basis is prevented from being applied to that substance. But if this metallic earth has any preference to alum, for other colours on cotton, it might be procured united to acetous acid, by a process, which I have lately discovered, somewhat similar to that for making the printer's liquor; viz. by adding to a solution of tin in marine acid, a solution of sugar of lead. The marine acid will unite with the lead, and precipitate as *plumbum corrodum*; and the vegetable acid will unite with the tin—with which it could not easily be saturated by any other mode; for the acetous acid has very little power to dissolve tin in its metallic form.

The cupreous basis may be obtained from blue vitriol, and from verdigrease, or acetated copper. It is seldom used by itself, but generally in conjunction with alum.

The martial basis, where wool and silk is concerned, is obtained from green vitriol or copperas; but, this basis is best procured for cotton, from a solution of <sup>iron</sup> in acetous acid, or even as it should seem in the astringent principle. For a solution of iron is used by the dyers of cotton with great success, which is formed by stratifying old iron with alder bark, and digesting them in water.

It

It may also be worthy of remark, that cotton, having but a weak attraction for colouring matter, requires that it should be presented under every advantage: and the Dijon Academicians having proved, that the mineral acids are destructive of the astringent principle, in which the colouring matter of these substances requiring a basis seems to reside; this property, added to others, may be a reason for their rejection, and for the preference given to the acetic acid.

Having thus given an account of the various preparations that are generally used for wool, silk, and cotton, and of the bates, applied for the reception of the colouring matter, let us next take a view of the *particular* preparatory operations, practised in the process for dying the Adrianople or Turkey red on cotton; and to these also add a detail of the process itself. It is proper to premise, that all the wooden vessels employed should be made of deal, or of some white wood, free from astringent matters, and that the most convenient quantity for operating on, in proportion to the ingredients used in the several operations, is sixty-six pounds of cotton.

From sixty pounds of Alicante barilla, a ley is drawn, by means of soft water, amounting to sixty gallons—and then, by the pouring on of fresh water, a second ley is formed, measuring forty gallons—after this, a third ley is also extracted from

from the same barilla, the quantity of which should be about fifty-two gallons.

A liquor is also prepared, consisting of four gallons of sheeps' dung, collected, after it has been excreted from the animal, and before it has been exposed to rain, dissolved in twenty gallons of water, and strained through a hair sieve, to separate from it the grosser parts.

These preparatory measures being taken, the first operation consists in adding nine pounds of Gallipoly oil, to eight gallons of the second barilla liquor; this forms a kind of soap, to which are to be added twenty-four gallons of the first barilla liquor, twelve gallons of the dung liquor, and forty-eight gallons of soft water. Into this liquor, when nearly of a scalding heat, the cotton is to be put; room being made for it by taking out about twenty gallons of the liquor, which is to be gradually returned into the pan, in proportion to the waste by evaporation: and the whole is to be kept boiling, during five hours. After which the cotton is taken out of the pan, suspended over it to drain, and then well rung, washed in clear water, and hung on smooth poles to dry, either in the open air, or in a stove; but the former is to be preferred, if the weather be fair.

The liquor wrung out of the cotton is to be preserved, together with the remainder in the pan, for a future operation; and, at this time,  
sixteen

sixteen gallons of soft water are to be added to the dung liquor.

The second operation consists in pouring three pounds and half of Gallipoli oil, into a bucket, containing four gallons of the second barilla liquor, and adding this mixture to six gallons of the first barilla liquor, and four gallons of dung liquor. Of this composition two or three gallons are to be put into a tub, and, in it, about a pound and quarter of the cotton is to be well soaked, and afterwards wrung, but not too closely, over a tub, kept for that purpose. A similar portion of cotton is then to be treated in the same way; and so on, till the whole has passed through the mixture; adding about a pint or three half pints of liquor, on the immersion of every fresh parcel of cotton. The cotton is then to be thoroughly dried; which it must also be after the subsequent operations; and these are to be conducted in the same manner, with respect to the manipulations, as in the present one.

In the third operation, the liquor which had been wrung out of the cotton, is to be poured back into the tub, in which the soaking has been performed: and to this are to be added of Gallipoli oil three pounds and half, and of the second barilla dung, and first barilla liquors, four gallons, each. After this operation the dung liquor is to be strengthened by the addition  
of



of about two handfuls of sheep's dung, diluted with a little water.

The fourth operation is similar to the third. The liquor which remains, is to be set aside, for the purpose of mixing with the residuary liquor, after the eighth operation; to be used for other cotton, in any subsequent process.

The dung liquor is omitted in the fifth operation; and the mixture employed in the three following operations is called the white liquor, to distinguish it from that used in the three preceding parts of the process, which, from the colour imparted by the dung is named the green liquor.

The same quantity of oil, as before, is to be mixed in a bucket with four gallons of the second barilla liquor; and poured into a tub, where are to be added to it, three gallons more of the same liquor, and four gallons of the first barilla ley. About four gallons of this liquor remain after the wringing, and these are to be added in the sixth operation. To the same quantity of oil, first mixed with four gallons of the second ley, and then with two gallons (more or less, in proportion to the quantity of white liquor remaining after the preceding operation) of the same ley, and four gallons of the first.

In the seventh operation, the quantities of all the ingredients are the same as in the sixth. The residuum of the white liquor, after the three last operations

operations, will be about eight gallons, and is to be preserved to be used in the fourteenth operation.

The eighth operation consists in heating the third barilla liquor, amounting to fifty-two gallons, to about the warmth of new milk; removing it, when thus warmed, from the copper to a tub, immersing the whole of the cotton therein, and suffering it to remain for twelve hours, or longer. It is then to be taken out, and laid on a cloth spread on four or five sticks, placed across a large tub, into which the liquor drains, as it runs from the cotton. The cotton is then to be well wrung, and afterwards thoroughly washed, that no loose oil may remain, which would be injurious to the next operation.

The wringing tub and peg are, now, to be well washed, and a fresh set of poles used; for if any oil were to come into contact with the cotton, in the next parts of the process, it would receive a blackish tinge in the dyeing.

The galling forms the ninth operation.—Sixteen pounds of galls, or if the blue galls be used, a somewhat smaller portion, are put into twenty-four gallons of water, nearly boiling. The liquor is then brought to boil, and the ebullition continued for fifteen minutes. But as soon as the boiling commences, the fire should be withdrawn; as the heat already received, will keep  
it

it up for a sufficient time, and the galls will not settle if it be too violent. The liquor is to be carried to the wringing tub, in the quantity of three or four gallons at a time, according as it is soaked up by the cotton, till one half of it has been thus employed. And the cotton is to be worked in it, as hot as possible, by means of a stick passed through the skains. After this, it is to be dried either wholly, or in part, in the open air. If it cannot be thus completed, for rain would in this state, and especially as the cotton approaches to dryness, be highly prejudicial, the drying must be finished in a stove. The liquor which has been wrung out is to be added to the remaining half in the copper.

For the tenth operation, this remaining decoction of galls is to be heated, the thick sediment at the bottom being previously separated by a hair sieve, and the cotton again treated as in the ninth operation.

The eleventh operation is the aluming of the cotton. Thirty pounds of Roman alum, finely powdered is put into sixteen gallons of water, gradually heated, and continually stirred. As soon as it becomes so hot that the operator can easily bear his hand in it, the fire is to be removed. Six gallons of the first barilla liquor are, then, to be added, by degrees, and the whole agitated till the solution is complete.

The cotton is to be placed in the wringing tub, about three gallons poured on it, and in proportion as the solution is soaked up, more is to be added, till about one half of it is employed. The cotton, having been thoroughly worked in the alum liquor, is to be well wrung and dried, and the portion which is wrung out, is to be returned to the remainder in the pan, and used in the twelfth operation, which is performed, exactly in the same manner as the eleventh. After which the dried cotton is to be well washed, by handfuls, in running water, the workman holding in each hand, about twenty ounces of cotton. for two minutes. Each portion is then wrung, and separated, washed and wrung again, and laid upon a coarse cloth. The whole is then carried up from the river, wrung a third time and hung to dry. The cotton will now be ready for the thirteenth operation, in which the colouring substance is applied to the cotton.

The cotton is first divided into four equal parts, each of which is to be dyed separately; and these are subdivided into skains or parcels of about a pound and quarter each. The copper pan is then to be filled with water, within about six inches of the top; and twenty six pounds of Smyrna, or rather of Cyprus madder, added to it. As soon as the water becomes milk warm, fourteen pounds of sheep's blood, as fresh as it  
can

can be procured ~~it~~<sup>are</sup> to be stirred into it. When the liquor is so warm that the workman can just bear his hand in it, one fourth part of the cotton is to be put into it, suspended on sticks; by means of which it is moved backwards and forwards in the pan, every five minutes; and the skains are to be inverted every ten minutes, so that they may receive the dye equally in every part. This business is continued for about fifty minutes. The cotton is then hung on five sticks only, and so suspended by strings as to be wholly immersed in the liquor, which is now made to boil, and continued boiling for forty-five, or fifty minutes. A white froth, which about this time appears on the surface is a sign that the madder is exhausted of its colouring matter, and that the cotton can receive no benefit, though it will get no injury from continuing longer in the liquor. It is then to be withdrawn, carried to be well washed in the river, or wash-wheel, and then wrung and dried.

The other three fourths of the cotton, are then to be successively dyed in the same manner, fresh ingredients being used for each parcel.

The fourteenth operation is represented as highly essential to the success of the process. Should it be omitted, the colour, it is said, would not only be so unfixed, as to lose much in the subsequent operation, but would likewise

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require

require more time for the enlivening. About eight gallons of the white liquor, which remained after the seventh operation and were directed to be reserved, are now to be mixed with four gallons of the first barilla ley. Two gallons of this mixture being put into the wringing tub, the whole of the cotton is to be washed in it, adding more liquor in proportion as it is soaked up by the cotton; which is afterwards to be wrung and dried.

To this succeeds the fifteenth and last operation, viz. that of enlivening or reviving the colour. The copper pan being about half filled with water, twenty-eight or thirty gallons of the liquor remaining after the first operation, are to be added, so that the liquor may reach to within six inches of the top. When the liquor is nearly boiling, the cotton is to be put in; being previously formed into parcels of about two pounds and a half each; nearly four ounces being kept separate, for a purpose hereafter to be described.

The cotton is to be well pressed down in the pan, and confined by sticks. The pan is covered with a wooden lid, having a small hole, through which the small portion of cotton, reserved for that intention, may be occasionally withdrawn, in order to observe the progress of the operation. This hole has a moveable cover. The lid is then to be secured by a strong cross  
of

of wood, with a straight piece over it; and the sides made close, so as to confine the vapour, by laying round the edges of the lid, a quantity of damp linen cloth. The fire is then to be raised, so as to make the liquor boil, and the boiling is to be continued, for nine hours.

The process is finished by taking the cotton out of the liquor, wringing and drying it. But the drying is never to be performed either in a stove, or in strong sun-shine. The colour will be most brilliant, if the cotton be dried in the shade, with a free access of air.

I must beg the indulgence of the Society for another division; in which I shall endeavour to give a theory of dying, as far as *bases* are concerned; and especially of the process of which we have just given a detail.

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## P A R T    T H I R D.

READ JANUARY 3, 1786.

**N**OTHING can lead more effectually to the improvement of any art, than a right understanding of the instruments, or agents employed in the practice. Though long experience may establish a number of facts, yet if the rationale of the manner by which they are produced be not understood, misapplications are

llable to be made; similar practices are pursued, where the cases differ essentially; and improvements are attempted at hazard, and often on false principles.

Though it may not be granted, that in the scouring of the several materials, which are to be subjected to the art of the dyer, their tubular pores are enlarged, or even divested of any matter which obstructs them; yet it will not be disputed that the intention of these processes, is to remove, an oily or a resinous matter which invests the fibres, and fills up the interstices of the filaments; either rendering the material less white, or lessening its attraction for water, and for the colouring matter, intended to be applied. For the more brilliant colours, in order that they may be exhibited in their greatest lustre, the scouring and bleaching is generally carried to such a degree, as only to be short of injuring the texture; and the material always suffers a loss of substance.

In the preparation for the Turkey red, the case seems to be different. No bleaching is allowed; and the first operation of the process is of a kind, that is rather likely to add to the weight, than to subtract any thing from it. The cotton is boiled in a mixture of barilla, or impure mineral alkali, oil, and animal excrement. Were the sole intention of this operation to scour the cotton, or, as the dyers phrase is, to  
open



open its pores; would not the barilla alone be more efficacious? And for what reason can we suppose that the sheep's dung, which contains a quantity of foul, colouring matter, should be added? We have seen that in the scouring of silk, where a perfect soap is used, some portion of it adheres, notwithstanding the washing the silk undergoes. The cotton is indeed also well washed after this first operation; but it is most likely that water will not be able to remove the whole substance of this animalised soap. And it seems also probable that the imperfect soap, or mixture of oil and alkali, together with the dung liquor through which the cotton is so often passed, will continue to furnish somewhat to it.

For animal substances, contain an acid which is separated in various forms. We have already seen that saccharine acid is obtainable from them by means of nitrous acid; the blood affords the Prussian acid, and also phosphoric acid. This last is contained still more abundantly in the urine and in the bones, but we shall defer the consideration of the use of animal acid in dying till we come to treat on the subject of bases.

The idea of animalizing vegetable substances to promote their attraction for colouring matter, occurred to me many years since; and the late Sir Torbern Bergman seems to have held a

similar opinion. We have seen in the abstract I have given, of M. Betholet's analysis of animal and vegetable substances, that wool and silk yield much acid of sugar, together with a fatty oil, whereas cotton gives no saccharine acid, no oil, and, in short, that the whole substance is capable of being dissipated in the form of gas, leaving no residuum in the retort, and communicating nothing permanent to the nitrous acid which distils into the receiver.

I wish that some person, whose opportunities and leisure are greater than mine, would compare, by such an analysis, cotton, in its natural state, and cotton prepared in the seven leading operations for the Turkey red; in order to determine whether it have, by this treatment, acquired properties more nearly approaching to animal matter; viz. whether in the latter state it will afford more acid of sugar, and give over on distillation, an oily matter, resembling that obtained from animal substances.

Another point which it might be important to ascertain is, what increase of weight the cotton acquires after each steeping. It appears from the account of the Gentlemen appointed to superintend and repeat Mr. Borelle's process, that, previous to the maddering, or imparting of the colouring matter, the cotton had increased to the amount of  $\frac{1}{3}$  of its original weight, though it had been well washed  
previous

previous to that operation. In this increase however, was included what it had acquired in the operations of galling and aluming.

The operation of galling, in this as well as some other processes of dying is used previous to the application of the basis to the material. Galls contain an astringent matter to which chemists have lately given the appellation of the astringent principle; and the Dijon Academics have proved it to be of an acid nature. It has not only the property of decomposing metallic, but also earthy solutions, and of combining, with the precipitates which fall from them. Hence its use previous to the aluming in the process of dying. Steep cotton, which has not been galled, in a solution of alum, the solution remains clear, and the cotton, when dried, shall be covered with aluminous crystals. Let another parcel of cotton, which has been galled, be immersed in a similar solution, the liquor shall become turbid, and plain marks of precipitation appear.

This astringent principle is of still farther use in the art of dying, and we shall presently see the manner in which it acts, when combined in those vegetables which afford colouring matter.

Having thus given an account of the previous operations in dying relative to the application  
of

of the basis, let us next inquire into the principles on which this application is made, and the modes by which it is more firmly attached to the material.

We have already remarked, that alum contains an earth in its composition, united to vitriolic acid. This earth is purely argillaceous, and may be separated from the acid to which it is united, by any substance to which either the earth or the acid, has a stronger attraction than they possess to each other.

The first theory we meet with to account for the action of alum and other intermediate substances used to furnish bases for colouring matter in dying, is that of M. Hellot, who supposes that these saline bodies form vitriolated tartar, a salt difficult of solution in water; and, that the minute crystals of this salt, insinuate themselves into the pores of the material to be dyed; that to these crystals the colouring matter becomes attached and firmly united, and they to the material, so as to resist the solvent power of water. Thus, when tartar and alum are used, he imagines the vitriolated tartar to be formed from them; and, in every other case of dying, he accounts for the production of a vitriolated tartar; but often in a manner by no means satisfactory. This vitriolated tartar, he describes, as crystallizing in the dilated pores of the cloth; attracting the colouring matter; and  
being

being difficult of solution in water, detaining the colouring particles, which are farther cemented by the crude tartar.

But though these salts are not *easily* soluble in water, yet a *sufficient* quantity of water will dissolve them; and, if the colouring particles were attached to them, they must be carried off whenever the solution of the salts is effected. But as this is not the case (for when these particles are properly affixed to the material, they are not moveable by any quantity of water, however large) their fixity must depend on some more permanent basis.

Mr. Keir, the ingenious translator of Macquer's Dictionary of Chemistry, appears to have been the first who suspected that the earth of alum was precipitated, and in this form attached to the material. Indeed it seems wonderful that this idea did not occur to M. Hellot, who was fully aware that in the dying of scarlet, the cochineal became firmly united to the white calx of tin.

M. Macquer, in the last edition of his Dictionary, has been more explicit on this subject. From the experiments which have been alluded to, in the second part of this paper, by which laques and carmine are made by pouring solutions of alum or of tin, into clear decoctions of extractive resinous colouring ingredients; he concludes that the same effects take place in dying; that when the materials are loaded with these  
earthy

earthy or metallic salts, and then thrown into the liquors impregnated with the colouring substances, the colouring matter quits the other principles to which it was united, seizes on the earthy basis of the salt, and uniting with it, loses its solubility in water, and, in this combination, becomes attached to the material, in so permanent a manner, as not to be washed away by water. M. Macquer, however, does not seem to have been aware that it is by means of the astringent principle that this precipitation is effected. All the substances which form laques contain this principle; as is evinced by the blackness they produce with martial solutions; and to this the colouring principle seems to be closely united. A few drops of infusion of galls produces an immediate precipitation of the earth of alum from its acid. This precipitation is more copious than that produced by any of the common colouring substances, and is, at the same time, white.

Here again new experiments are suggested. Let a large quantity of earth of alum be thus precipitated by galls. Let the precipitate be well washed, and afterwards exposed in a retort, with a receiver adapted to it, to a strong heat. The astringent principle, if united to the earth of alum, being volatile, will probably be driven over into the receiver, and thus the supposed combination be rendered evident.

Again,

Again, let the supernatant liquor, from which all the earth has been precipitated, be examined, to see in what state of combination, the vitriolic acid of the alum, remains.

In the common dyes, then, with metallic or earthy barks, the theory is pretty clearly as M. Macquer has represented, only taking the astringent principle into the account; and, with respect to wool and silk, nothing more seems necessary than the impregnation of the one, with alum and tartar, and, of the other, with alum alone, previous to their immersion in the coloured liquor.

But when COTTON is to be dyed, and some of these barks are requisite, not only the basis is to be precipitated by the astringent colouring principle, but the attraction of the material to the basis is to be increased by other intermedia. The permanency of the extractive dyes, therefore, depends on the previous treatment of the cotton, and, where alum is employed, of that salt, so as to procure a more copious precipitation of its earth, and to unite it, by means of other substances, to the material.

For this reason, in the common dying of cotton, the alum is previously neutralised by the addition of alkaline salt, whereby not only the acid is prevented from injuring the cotton, but the alum is put into a state more ready to be

be precipitated by the astringent colouring matter.

For this reason also, in the process of callico printing, the earth of alum is made to change its natural acid for the acetous. For by this means, not only a salt is prepared, capable of dissolving more copiously in water than common alum, but, the acetous acid being more loosely attached to the aluminous earth, is, as it becomes concentrated by drying, easily driven off by heat; the earth being left spread upon, and cemented to, the callico.

When speaking of the use of animal substances, it was observed, that they yield several different acids by various modes of analysis, viz. The phosphoric, the sebaceous, the Prussian and the saccharine. Of these the two first are formed in the animal system, the third is perhaps the creature of fire, and originates from a combination of some of the more simple constituent parts of animal substances; and of the last it should seem that these substances only contain the basis\*. M. Bertholet by uniting caustic alkalis with animal substances is said to have found them neutralised, and that the animal matter, when afterwards separated from the alkali, is no longer susceptible of putrefaction. This animalised neutral salt may be decomposed by means of alum,

\* Critical Review, vol. LXII. p. 377.



and, while the vitriolic acid seizes on the alkali, the earth of alum becomes intimately combined with the animal acid. It appears to me highly probable, that this acid is supplied to the cotton, in the process for dying the Adrianople red. That the attraction between the cotton and acid being strong, and that between the latter and the earth of alum being likewise powerful, such an union is effected as assists in rendering the material capable of attracting and retaining the colouring matter, in as forcible and permanent a manner, as can be done either by wool or silk.

The use of the galls also in this and other processes seems intended to promote a similar purpose. Cotton either unbleached, or which has undergone no process but that of bleaching, when immersed in a solution of alum, produces no change in the appearance of the solution; but as has been already shewn, cotton previously steeped in an infusion or decoction of galls, soon renders the liquor turbid, occasioning a precipitation of the earth of alum on the cotton.

The imperfect soap also, formed by the union of the alkali and oil when mixed with the alum, will both decompose that salt, and be itself decomposed, and a soap of a different nature will result from the union of the oil, with the earth of alum. M. Bertholet who has made several experiments on earthy and metallic soaps, found  
this

this argillaceous soap to be totally insoluble in water and in spirit of wine. It is probable also that the blood which is employed with the madder, may supply both animal salts and a glutinous matter to the cotton. This seems to be the use of the blood, and not, as M. Borelle supposes, to communicate a pinky tinge to the madder.

Here then appear to be several different substances employed, tending to form insoluble compounds with the argillaceous earth of the alum. But whether, when deposited on the cloth, they remain so many distinct compounds, or may all unite into one insoluble body, I do not pretend to determine.

M. Macquer, whose opinions always deserve the most respectful attention, declares, that the excellence and permanency of the Turkey red depends on the great quantity of alkali, used in the process of aluming, redissolving the earth of alum after its separation from the vitriolic acid, and forming with it a saline compound, easily separable into its constituent parts, so that the aluminous earth may be conveniently deposited on the cotton and united to the colouring matter. The following is a translation of his own words, from the last edition of his Dictionary.

“ In examining,” says this excellent chemist,  
 “ the effects of all the complicated operations,  
 “ attendant

“ attendant on the Levant or Adrianople process  
“ for giving to cotton a more beautiful and du-  
“ rable red, by means of madder, than can be  
“ communicated by the common methods, I  
“ was struck with a singularity which attends  
“ the aluming in this process, and consists in  
“ mixing a great quantity of alkali with the  
“ solution of alum, previous to the impregnation  
“ of the cotton with it.

“ As the alum is certainly decomposed, by  
“ the mineral alkali, in this operation, I wished  
“ to discover what was the result; and I found  
“ the alkali, at the instant it precipitated the  
“ earth of alum, redissolved a considerable part  
“ of it, and that the alkaline salt with aluminous  
“ basis is the real mordant in the Levant process.  
“ I have actually determined, by suitable ex-  
“ periments, 1st. that both fixed and volatile  
“ alkalis, especially if caustic, are capable of  
“ reducing to a saline state a sufficiently large  
“ portion of earth of alum, even in the moist  
“ way; and that, by calcination, the fixed alkali  
“ is capable of dissolving a somewhat larger  
“ quantity of this earth. 2dly. That this alka-  
“ line earthy salt is decomposed, even by water  
“ alone, but still more easily by means of a  
“ decoction of madder, or other extractive tinc-  
“ tures, on the colour of which the earthy part  
“ of the salt seizes, and forms with it a laque,  
“ or coloured precipitate, in the same manner

“ as the mordants when formed of an acid com-  
 “ bined with an earth or a metal. 3dly. I have  
 “ proved, by several experiments that when  
 “ cotton or linen is impregnated with a strong  
 “ solution of this alkaline mordant without any  
 “ other preparation than scouring and galling,  
 “ these substances receive, in the madder bath, a  
 “ red much more beautiful and deep, than can be  
 “ given them, when alum alone is used.\*”

Notwithstanding my deference for the opinion of this great man, yet I must on this occasion differ from him, for reasons which, it is hoped, will prove satisfactory to this society.

1. The portion of barilla used in the operation of aluming, is only six pounds, supposing the whole quantity employed to be dissolved in the first liquor; but as there are two other solutions made before the whole of the salt is dissolved, it is probable that six gallons of the first liquor, will not contain near one half of that weight; for the barilla being dry and hard, and the mineral alkali less soluble than the vegetable, the first water will act but slowly on it; and it is observable that, through the whole process, the second liquor is considered as the strongest, and used for mixing with the oil. Besides not much above one half of the barilla consists of aerated mineral alkali. We may there-

\* Macquer, Dictionnaire de Chymie, seconde edition, tome quatrieme, article Teinture.

fore conclude that the amount of this salt, contained in six gallons of the first barilla liquor, the quantity added to thirty pounds of alum, does not exceed one pound and half. Now as 100 parts of alum contain 38 of vitriolic acid, these will require for their saturation, 37 of aerated mineral alkali; so 30 parts of alum containing 11 : 4 of that acid, these will require for their saturation 11 : 1 of the same alkali. Whereas the quantity employed amounts only to 1 : 5; or rather more than  $\frac{1}{5}$  of the quantity requisite for the neutralization of the acid. And as a superabundant quantity of the precipitant, above what is necessary to the saturation of the acid, is necessary before re-solution of the precipitate can take place, we have in this case no reason to expect it.

2. The quantity of alkali employed is not superior to that used in the aluming in other processes for dying with madder.\*

3. The alkali, being aerated, is in the most unfavourable state for redissolving the aluminous earth; and

4. The re-solution of the aluminous earth takes place only so long as any of the superabundant vitriolic acid remains unneutralised; except the addition of alkali be continued, after the precipitation of the aluminous earth is

\*  $\frac{1}{6}$  or  $\frac{1}{5}$  of the alum.

wholly effected: and it cannot be supposed that the alkali with which the cotton has been impregnated, in the previous operations, added to that contained in the barilla liquor, mixed with the alum can be such, even if it were in an uncombined state, as to produce supersaturation.

It should seem probable therefore that the permanency of the Turkey red depends on the causes already assigned, and that its brightness is produced by the action of the mineral alkali on the madder. This appears, at first sight, discordant with the theory of Mr. Delaval that alkalis reduce red colours to crimson, and these to purple; whereas in the present case the red is brightened, by boiling in a strong solution of mineral alkali; but the fact is perfectly agreeable with that theory; for the madder colour is too much inclining to a dusky orange, and this, by means of the incrasating alkali, descends to red.

Before I conclude, permit me to advance a few circumstances relative to the black dye.

For the dying of black, the calx of iron is the mordant employed, and this uniting with the astringent principle of the galls forms a black pigment which is attracted and adheres to the material to be dyed.

The late Dr. Lewis had ascertained, by a number of well conducted experiments, that the colouring matter of ink, consisted of a very finely attenuated calx of iron, combined with  
this

this principle. He found also that this matter, (which, if not kept suspended by some mucilaginous substance, separates and precipitates from the liquor) resembles, in some degree martial æthiops, but that it was not, like that powder, attracted by the magnet, till after it had been exposed to a red heat; when it lost its blackness, and became of a rusty brown colour:—a proof that the black colour of ink or of the black dye, which is formed on similar principles, does not depend, merely, on the iron acquiring phlogiston from the galls. He also found that both acids and alkalis destroy blackness thus produced; the former by dissolving the ferrugineous body, the latter by acting on the astringent principle. He, however, was of opinion, that this principle was of a fixed, not a volatile nature. But our worthy president, Dr. Percival, very early suspected that this astringent principle possessed some volatility. In support of his opinion, he mentions, artichoke stalks, losing their astringent principle by being dried in an oven. He likewise appears to be the first who observed the action of acids and astringents on each other.

The subject has been farther pursued by the Dijon academicians; from the result of whose experiments it appears, that the astringent principle is soluble in water, in spirit of wine, in oils, and in æther; that it rises copiously

in distillation, reddening the blue vegetable juices, but capable of uniting, with equal facility, with acids, and with alkalis. That though it does not revive iron, without the aid of fire, yet gold and silver are precipitated, by it, in their metallic form; and that it is capable of decomposing most metallic solutions, and giving different colours to their precipitates.

Dr. Percival had endeavoured to produce an ink, by macerating iron filings, without their being combined with any acid; but, making his infusion without heat, he did not succeed. The Dijon chemists, not content with making a similar attempt, boiled the liquor; and thus obtained a violet coloured ink, the traces of which were as well defined and permanent, as those produced by ink prepared in the common way, even without the addition of gum. Hence it should seem, that the heat not only enabled the astringent principle to dissolve the iron, but also extracted a mucilaginous matter which supplied the use of gum.

I have related these facts in order to elucidate some circumstances attending the dying of black. Green vitriol was formerly used; but the calx of iron is too much dephlogisticated in this salt, and the black produced by it is not permanent. Solutions of iron in acetous acid have of late been preferred, especially for  
cotton;



cotton; and even solutions of that metal, made by macerating it with alder bark and water, in which the astringent principle should seem to unite with the vegetable acid, to form the solvent. In these solutions the iron is not too much deprived of its phlogiston; and contrary to those made in mineral acids, they improve with age, for the vegetable acid, tending to putridity evolves phlogiston, which unites with the iron; whereas the vitriolic solution is continually parting with that volatile principle, and thereby becoming not only less fit for producing blackness, but the calx of iron, when highly dephlogisticated, is very injurious to the texture of the cloth.

The improvements made in the dying black, are perhaps the strongest proofs that can be given of the utility of chemical knowledge. Nor can a more apt instance be adduced of the inconvenience arising from the want of it, than the French process, related by M. Macquer for this purpose; in which no less than thirty different ingredients, or at least bearing different names, are directed to be employed; several of which are the same things under different denominations; and others tend directly to destroy each other.

I know not whether to apologise more to the Society, for the length of this paper, or for the imperfections it contains. The former I could

not well avoid, in order to make it sufficiently comprehensive; and for the latter, I must beg leave to plead my numerous avocations which have caused me to compile it in haste, and in a very interrupted manner.

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OBSERVATIONS *respecting the* HISTORY of  
PHYSIOGNOMY; *by* THOMAS COOPER, *Esq.*

THE dispute among the Literati of the last century, on the comparative merit of the ancients and moderns, has at length subsided. The few late attempts by some of our writers\* to reinstate Plato and Aristotle at the head of the ranks of science, have been coolly received; and the moderns in general have acquiesced in their own pre-eminence. There seems indeed some reason for this decision in our own favour: and it will be readily acknowledged, that within a century or two, we have greatly extended the bounds of knowledge, by contenting ourselves with slow but sure advances, and by relying upon fact and experiment in pre-

\* Harris Monboddo.

ference to conjecture and hypothesis. I cannot help thinking however, that although we may have shewn many of the ancient systems to be merely the creatures of imagination, we have in some cases concluded much too hastily; and unreasonably denied the existence of that knowledge, which we have not been at the pains of acquiring.

These observations seem to me to be sufficiently applicable to the *science of physiognomy*; a science, which, though practised by Pythagoras,\* defended by Socrates,† approved by Plato,‡ and treated by Aristotle,|| is hardly mentioned at present, but in conjunction with magic, alchemy and judicial astrology. Without any pretensions however to a knowledge of physiognomy as a science myself, I have always regarded it in a light more respectable; and as the recently published work of M. Lavater seems to have excited a considerable degree of attention on the continent, the society perhaps will not be displeased, if I lay before them such

\* Auli Gellii, lib. I. cap. 9.

† Cic. de fat. V. & Tuscul. Quæst. XX. IV.

‡ In Timæo.

|| *Physiognom.* Aristotles *Physiognomy* has been suspected as spurious, but without sufficient reason. Diogenes Laert. quotes it, lib. V.

literary observations respecting the progress of physiognomy as my reading has suggested.

There has been some dispute\* respecting the *etymology* of the term; some deriving it from φύσις nature and γινώσκω to know; others from φύσις and γνῶμην an index; others from φύσις and γνῶμη a mark; according to these last derivations, physiognomy, will be, a knowledge of nature from the indices or marks of it. This extended signification to which the etymology of the word leads, I have noticed, because I think it is remotely connected with the doctrine of *signatures*.

For the same reason it may be worth while to mention the controversies respecting the *definition* of physiognomy. The ancients seem to have confined physiognomy to man, or at least to animated nature. Thus Aristotle, † *nunc autem dicam ex quibus generibus signa accipiantur: et sint omnia; ex motibus enim physiognomizant et ex figuris et coloribus, et ex moribus apparentibus in facie, et ex levitate, et ex Voce, et ex Carne, et ex partibus et ex figura totius corporis.* So Cicero, ‡ *—hominum mores naturasque, ex corpore oculis*

\* Vossius Etymolog. & Martini Lexicon sub voce.

† Physiognomic. cap. II. ἀλλ ὡν δὲ γένωνται σημεῖα, &c. To save the room that the originals and translations of all the passages quoted, would occupy; I have given the Latin versions only of the Greek quotations.

‡ De fato. V.

*vultu, fronte pernoscere.* To the same purpose Aulus Gellius,\* *Id verbum significat mores naturasque hominum conjectatione quâdam, de oris et vultûs ingenio, deque totius Corporis filo atque habitu sciscitari.*

But when the study of physiognomy was revived in the middle ages, the comprehensiveness of the etymological meaning (as I imagine) led those who treated on the subject, to indulge the prevailing taste for the marvellous, and extend the signification of the word, far beyond the ancient limits. This seems to have been particularly the case among those naturalists who adopted the theory of *signatures*. Hence physiology came to signify, the knowledge of the internal properties of *any* corporeal being, from the external appearances. Thus Joannes Baptista Porta, a physiognomist and philosopher of great note, wrote a treatise concerning the physiognomy of *plants* (*Phytognomonica*) throughout which he uses physiognomy as the generic term. The same person I believe it was, who wrote the Treatise *de Physiognomia Avium*. Gaspar Schottus, in his *Magia Physiognomica*, makes the *physiognomia humana*, a subdivision of the science. Hen. Alsted† adopts also the extensive significa-

\* Lib. I. cap. 9.

† In his Cyclopædia.

tion now mentioned. So also does Boyle,\* and it seems to have been the common one with us, in the time of Hudibras.† At present physiognomy seems to be confined to the knowledge of the moral and intellectual character of human creatures, from their external manners and appearance.

These variations of the meaning however, it was proper to notice, not only for the reason before assigned, but because the *definition* of physiognomy was a subject of long discussion between two modern authors of some note, in the Berlin Transactions, † M. Pernetty and M. Le Cat. The former insisted that *all knowledge* whatever, was merely physiognomy, and the latter, as unreasonably, confined it to the subject of the *human face*. Mr. Pernetty's second Memoire is entirely occupied, in defending the extensive signification he has annexed to

\* Experimental history of mineral waters; append. § 4. " And I have sometimes fancied there may be a physiognomy of many if not of most other natural bodies as well as of human faces, whereby an attentive and experienced considerer may himself discern in them many instructive things that he cannot so declare to another man as to make him discern them too.

† They'll find i'th' physiognomies  
O'th planets all men's destinies.

† For the years 1769 and 1770.

the

the term, and which had been controverted by M. Le Cat. The subject did not drop here: soon after appeared the celebrated Treatise of Mr. Lavater, who although he expressly defines physiognomy, the art of discovering the interior of a man by means of his exterior; \* does more than countenance† the extended signification of the term, adopted by M. Pernetty. This work produced an attack upon physiognomy itself in the Memoires of the same academy for the year 1775, by M. Formey, who bestowed a great deal of pains in controverting the extent which M. Lavater had assigned, to his favourite science. The common idea annexed to physiognomy before mentioned, seems upon the whole as proper as any that have been given.

I do not find any authority sufficient to conclude that physiognomy was treated as a *science*, (at least in Greece,) before the time of Pythagoras. Of him it is asserted by Aulus Gellius, ‡ *Ordo atque ratio Pythagoræ ac deinceps Familiæ successionis ejus recipiendi instituendique discipulos hujusmodi fuisse traditur. Jam a principio Adolescentes qui sese ad discendum obtulerunt* *ἐφ' ὧν ὁρῶμεθα.*

\* Vol. I. p. 22, of the French edition, 4to.

† Ibid, p. 33, and vol. II. p. 89.

‡ Lib. I. cap. 9.—Proclus in Alcib. prim. Plat.—Iamb. in vit. Pythag. sub. Init.

*Id verbum significat mores naturasque hominum conjectatione quâdam, de oris et vultus ingenio deque totius corporis filo atque habitu sciscitari.* It is not improbable (if this be true) that Pythagoras acquired a great part of his physiognomical knowledge, and his attachment to that science during his travels; the Indians\* and Egyptians† being great professors of physiognomy.

In the time of Socrates, it appears not only to have been studied as a science, but adopted as a profession, of which the known story of

\* Nicestratus speaking of the Indians in his book de Nuptiis, says that in marrying they judge of their wives by their appearance, and declare they are never deceived; among the physiognomical marks he mentions these, *benigni enim oculi, summam animi pulchritudinem comitantur, et fieri solet, ut qui non excandescit, nec faciliè irascitur, aut bile movetur, faciem splendidam serenamque habet. Malignus et dolosus verò, statim et oculis transversè implacideque tuetur. Qui stolidus ac simplex est, pupillas et oculos patentes gerit ut asini et oves. Cui supercilia conjunguntur improbus est. Cujus superficies in vultu non rubet, sed obscura caliginosaque est nunquam ullo modo exbilaratur. Ceterum ejusmodi notæ, non modo virginibus et mulieribus, sed etiam viris insunt.* Raynaudi Moral. Discip. p. 367. See also Philost. Vit. Apoll. Tyan, lib. III. cap. 30, p. 83. πολλὰ μὲν γὰρ οὐφθαλμοί, &c. & lib. III. cap. 5.

† Ἀργυπτιοῖς μὲν γὰρ τοῖς πασι, &c. Gronov. Not. in Aul. Gell. lib. I. cap. 9. from the physiognomy of Adamantius. See also Jambl. in Vit. Pythag. lib. I. cap. 17. παρασκευασμένῳ δὲ αὐτῷ, &c.

the



the judgment passed upon Socrates by Zopyrus\* is a sufficient proof; subsequently it was noticed by Plato,† and expressly treated by Aristotle in a distinct book. As this forms a kind of literary epoch in the science of physiognomy it may be worth while to give a brief outline of Aristotle's sentiments on the subject.

He observes (in substance) that the subject had been treated in three different ways. That some physiognomists classed animals into genera, and ascribed a certain corporeal appearance, and a corresponding mental disposition to each genus. Others distinguished still farther and divided the genera into species. Thus among men, they distinguished the Egyptians, the Thracians, and the Scythians, and wherever else there was a known difference in habits and manners, and assigned the physiognomic marks accordingly. Some decided more from the actions and manners of the individual, taking for granted that such and such manners, proceeded from such and such dispositions. His own method of considering the subject was this: there is always a peculiar disposition of mind, attendant on a peculiar form of body; so that there is never found a human mind, in the corporeal form of any beast. Again; it is evident that the mind and the body act mutu-

\* Cic. de fato V.

† In his *Timæus*.

ally on each other. Thus in the cases of intoxication, sickness, and mania, the mind is affected by the affections of the body. In fear, sorrow, joy, &c. the body is affected by the affections of the mind. From these facts he concludes, that wherever a particular form or bodily character, appears in a human creature, and we know before hand from observation, and an induction of particulars, that a certain mental character is constantly concomitant, and therefore necessarily connected therewith, we have a right in all such cases to infer the disposition from the appearance—and this, whether we have drawn our observation from men or other animals. For as there is one mental character, and one corporeal form of a lion, and another of a hare, wherever in human creatures we observe the bodily characteristics of a lion, (such as strong and thick hair, large extremities, a deep tone of voice, &c.) we ought to infer, strength, firmness and courage. Wherever on the contrary, we see the slender extremities, soft capillament, or any other feature of the hare, we ought to conclude a proportional correspondence in the mental character. Upon this principle he enumerates the various corporeal features of man, and the correspondent dispositions so far as they have been observed; and as opportunities offer, he illustrates them by an appeal to the foregoing analogy,

analogy, and in some cases attempts to explain them by physiological reasoning.

This plausible and even probable theory, evinces a considerable degree of knowledge on this subject, at a very early period—individual physiognomy, national physiognomy, and comparative physiognomy, are here distinctly noticed; but it cannot with truth be asserted, that the enumeration of particular precepts and observations in the physiognomical treatise of this great man, are equally well founded with this outline of the subject. In fact, the state of knowledge in his time, did not admit of a complete elucidation of his general principles, nor was the brief and pithy style of Aristotle adapted to a subject, which even at this day will require frequent periphrasis to make it clearly comprehensible. Such as it is however, this work of Aristotle, appears to have served as a foundation for almost every physiognomical treatise that hath since been published. His comparative physiognomy of men with beasts indeed, though frequently, has not been *universally* adopted, but his language and his manner, sententious, obscure and indiscriminate, have been copied too closely, by his imitators of the sixteenth and seventeenth centuries. Beside this work of Aristotle expressly on the subject, there are many incidental observations respecting physiognomy that occur in his History of Animals, and other parts of his writings.

The ethic characters of *Theophrastus*, the disciple and successor of Aristotle, deserve also to be particularly noticed, as a distinct treatise on a most important branch of the science in question, *the Physiognomy of Manners*. This singular and entertaining performance composed by the author at the age of ninety-nine, describes synthetically, with great justice and accuracy, the most remarkable traits of behaviour which certain predominant characters, would respectively occasion. The translations and imitations of *La Bruyere*, render it unnecessary to give any examples of what otherwise it would be unpardonable to omit: suffice it to observe that this work of Theophrastus evinces such a degree of accurate observation, and lively description as will preserve it in the rank of classical performances so long as, the science of man, and the prominent features of human society, shall continue to be regarded as objects of attention.

About this time *Adamantius the Sophist* appears to have written; whose "*Physiognomics*" were published in several places about the middle of the sixteenth century. Adamantius however only trod in the steps of *Polemon* the Athenian, who had written before him, and whose treatise was republished in Greek and Latin much about the time of the former.\* So many au-

\* I was not aware till lately that the Greek writers on the subject of physiognomy were collected and published together, by Franzius, "*Physiognomiz veteres scriptores Græci. Gr. & Lat. à Franzio. Altenb. 1780, 8vo.*" I have not seen the book,

thors\* on the subject, sufficiently shew that physiognomy was much cultivated as a science among the Greeks about this period. The professors of physiognomy however appear soon to have connected with it something of the marvellous, as we may suspect from the story told of Apelles by Apion, *Imaginem adeo similitudinis indiscretæ pinxit ut (incredibile dictu) Apion grammaticus scriptum reliquerit quemdam ex facie hominum addivinantem (quos metoposcopos vocant) ex iis dixisse aut futuræ mortis annos, aut præteritæ.*† From the known practice of the Pythagorean School,‡ whose novitiates were all subjected to the physiognomic observation of the teachers, it is not improbable that the first physiognomists by profession among the Greeks,|| were of that

\* Hermes Trismegistus, Alchyndus, Helenus, Loxius, Pharaotes Indus (mentioned by Philostratus) are also mentioned as writers on physiognomy, but little more seems to be known of them in this respect, than the traditional quotation of their names. Voss. de Nat. Art. lib. I. cap. V. § 19.

† Pliny. Nat. Hist. lib. XXXV. § 35, par. 9.

‡ Aul. Gell. ubi sup. Mos Pythagoræis erat per signa in corpore constituta venientes ad eos judicare, utram ad meliorem vitam apti forent necne. Natura enim ipsa quæ animis confingit corpora instrumenta eis congrua subministrat, imaginesque animarum in corporibus indicat, per quas et animarum ingenia in hac arte periti deprehendere possunt. Proc. in Alcib. prim. Plat.

|| There were such probably among the ancient Indians. Vid. the preceding note\*.

fect; nor is it unlikely from the mysterious and ascetic nature of the doctrines and discipline of the Pythagoreans, that they also, were first tempted to disgrace the science of physiognomy in Greece, by annexing to it the art divination.

From this time to the close of the Roman republic, few observations occur respecting the literary history of physiognomy. About that period however, and from thence to the decline of the Roman empire under the latter emperors, it appears to have been attended to, as an important branch of knowledge, and adopted as a profession by persons pretending to superior skill in it.

There are many physiognomical remarks interspersed in the works of Hippocrates\* and of Galen,† as may well be presumed from their medical profession—Cicero appears to have been particularly attached to it; for he not only relates the story of Zopyrus and Socrates in his book *de fato*,‡ and his Tusculan Questions,‡ but his orations abound with physiognomical opinions. Thus, his oration against Piso, commences with the following abusive passage. *Jamne vides bellua que sit hominum*

\* In his book *de Aquis Aeris et Locis*.

† In his passages respecting the temperament.

‡ Ubi sup.

*querela frontis tuæ? Nemo queritur syrum nescio quem de grege novitiōrum factum esse Consulem. Non enim nos Color iste servilis, non pilosæ Genæ, non dentes putridi deceperunt. Oculi, Supercilia, frons, vultus denique totus qui Sermo quidem tacitus mentis est, hic in errorem homines impulit: hic eos quibus eras ignotus decepit fefellit, in fraudem induxit. Pauci ista tua lutulenta vitia noveramus: pauci tarditatem ingenii, stuporem debilitatemque linguae; nunquam erat audita vox in foro; nunquam periculum factum Consilii; nullum non modo illustre sed ne notum quidem factum aut militiæ aut domi; obrepisti ad honores errore hominum, commendatione fumosarum imaginum, quarum simile habes nihil præter Colorem.*—In the same strain he appeals to his auditors against the physiognomy of C. Fannius Chærea in his oration in favour of Roscius the comedian. *C. Fannium Chæream, Roscius fraudavit! Oro atque obsecro vos qui nostis, vitam inter se utriusque conferte—qui non nostis, faciem utriusque considerate—Nonne ipsum caput, et supercilia penitus abrasa, olere malitiam, et clamitare calliditatem videntur? Nonne ab imis unguibus usque ad verticem summum (siquam conjecturam asserti hominibus tacita corporis figura) ex fraude, fallaciis, mendaciis, constare totus videtur? Qui idcirco capite et superciliis semper est rasis, ne ullum pilum viri boni habere.*—I have quoted these passages, not only as instances of Cicero's attachment to the

science of physiognomy,\* but also as examples of the *antient* style of oratorical abuse. Similar instances of Cicero's manner occur in his observation on the features, &c. of Verres, Vatinius, and Anthony : † indeed he asserts generally in his book *de Oratore* ‡ *omnes enim motus animi suum quendam a natura habent vultum* ; which although it may be construed to relate to the transient physiognomy only, may well be applied to the permanent features in conformity to the passages already adduced from the same author.

Nor was Cicero, singular; among the classic authors of Roman literature, in his attention to physiognomic observation. The extracts in the notes from Sallust, § Suetonius § and Seneca,

\* See also a passage in his book *de Legibus* 1, 9 *Figuram autem corporis habilem et aptam, &c.*

† In his orations against them. ‡ Lib. III.

§ The physiognomy of Cataline is very expressive, *Colos ei exsanguis, sædi oculi ; citus modo, modo tardus incessus ; prorsus in Facie Vultuque Vecordia inerat.*

§ The description of Tiberius by Suetonius is extremely particular, as indeed are all those he has given us ; the following is a part of it ; *Colore erat Candido, capillo pone occipitium submissiore, ut cervicem etiam obtegeret quod gentile illo videbatur. Facie honestâ ; in quâ tamen crebri et subtiles tumores, cum prægrandibus oculis, et qui (quod mirum est,) noctu etiam et in tenebris viderent ; sed ad breve et cum primum a Somno patuissent, demum rursus hebescebant. Incedebat cervice rigida*



Seneca,\* those already adduced from Pliny† and Aulus Gellius,‡ and the passages I am about to mention from Petronius, Plutarch and others, abundantly establish this remark.

Beside the attention paid to physiognomy as a science by authors of repute during the period of the Roman empire, it should seem also that it continued to be practised as a *profession*, as well then, as in the classic age of Grecian philosophy. Plutarch, in his Life of Anthony, tells us of an Egyptian physiognomist who bade Anthony beware of Octavius.¶ Petronius Arbiter in his *Satyricon* introduces a person saying

*rigida et obstipa; adducto serè vultu, plerumque tacitus, nullo aut rarissimo cum proximis sermone, eoque tardissimo, nec sine molli quadam digitorum gesticulatione. Quæ omnia ingrata atque arrogantia plena et animadvertit Augustus in eo; et excusare tentavit sæpe apud Senatum et populum, professus Naturæ vitia esse, non Animi.* A great part of the character of this emperor may be traced not indistinctly in this description—I know of no author whatever so minutely attentive to the stature, features, gesture, manners and way of life, of the persons spoken of, as Suetonius.

\* *Annon vides quantum oculis det vigorem Fortitudo? quantam intentionem prudentia? quantam modestiam et quietem Reverentia? quantam Serenitatem lætitia? quantum Rigorem severitas? quantam Remissionem hilaritas?* Sen. Ep. 106.

† Nat. Hist. lib. XXXV. § 35.

‡ Lib. I. cap. 9.

¶ The physiognomic remark of Julius Cæsar respecting Anthony and Cassius is well known.

*Vides me? nec auguria novi, nec mathematicorum cælum curare soleo, sed ex vultibus tamen hominum mores colligo, et quum spatiantem vidi, quid cogites scio. Quo enim incessus arte compositus, et ne vestigia quidem pedum extra mensuram aberrantia, nisi quod formam prostituit ut vendas?*

Suetonius, in the *Life of Titus*, says, that Narcissus sent a physiognomist to examine the features of Britannicus, who returned and predicted that Britannicus would not succeed, but the empire would devolve on Titus. Other instances\* of physiognomy being exercised as

\* I had marked a reference to Gregory Nazienzenus Orat. 4. respecting Julian as a physiognomist, but on looking into Gregory for the passage I can find none such. I apprehend it must have been a mistake in lieu of the following physiognomic character of Julian by Gregory in his second oration against that emperor, which is worth noticing. *Sed me morum ipsius inconstantia atque incredibilis quadam mentis emotio vatem efficiebat: si quidem vates ille optimus est qui recte conjicere novit. Neque enim mihi boni quicquam significare atque ominari videbantur, Cervix non stata, humeri subsultantes et ad æquilibrium subinde agitati; oculus insolens et vagus furioseque intuens; pedes instabiles et titubantes; nasus contumeliam et contemptum spirans; vultus lineamenta ridicula idem significantia; risus petulantes et effrænati; nutus et renutus temerarii; sermo herens, spirituque concisus; interrogationes stultæ et præcipites; responsiones his nibilo meliores; aliæque in alias insultantes, nec graves et constantes nec eruditionis ordine progredientes; talem ante opera conspiciatus sum, qualem in operibus postea vidi.* Greg. Naz. Orat. 48 in Jul. 2 cura Joan. Leuenklaii, p. 793.

a Profession

a profession, might be adduced, but the preceding passages however they may contain a mixture of fable with truth, render the general fact sufficiently probable.

When the Roman empire was overthrown by the eruptions of the northern nations, this science shared the same fate with the others, and appears to have been unnoticed (except perhaps by the Arabian commentators on Aristotle with whom I am unacquainted) till about the beginning of the sixteenth century; from which time to the latter end of the seventeenth it was greatly in vogue, and almost all the approved modern authors who have treated practically on the subject published within that space.\* I can-

\* Such as Bartholem. Cocles. Baptista Porta. Honoratus Nicquetius. Jacobus De Indagine. Alstedius. Michael Schottus and Gaspar Schottus. Cardan. Taissierus. Fludd. Behmen. Barclay. Claramontius. Courtingius. The Commentaries of Augustin Niphus and Camillus Balbus on the Physiognomica of Aristotle. Spontanus. Andreas Henricus. Joannes Digander. Rud. Goclenius. Alexander Achillinus. Joh. Prætorius. Jo. Belot. Gulielmus Gratalorus and several others, whom Morhoff notices in his Polyhistor. vol. I. lib. I. cap. 15, § 4, and vol. II. lib. III. cap. 1. § 4. It may be proper to mention, that the only writers professedly on the subject of physiognomy, whom I have been able to consult on this occasion, are, Aristotle. Baptista Porta. Gaspar Schottus. Cardan. Fludd. Behmen. Alstedius. Le Chambre. Letters on Physiognomy. Evelyn. Lancisi. Dr. Gwither in the Transactions of the Royal Society. Pernetty. Le Catt, and Formey, in the Berlin Transactions, and Lavater.

not help regarding it however, as rather unfortunate for the science of physiognomy, that many opinions now justly exploded, were holden in high estimation not only among the literati in general, of the same period, but by the very persons who were authors on the subject of physiognomy, and patrons of the study. Nay, by some of these writers, physiognomy was regarded as essentially connected with doctrines, which the literature of the present day would be ashamed to adopt, and treated accordingly in conjunction with them.

This remark appears to me, so intimately connected with the literary history of the science in question, as to demand some further discussion.

The history of human learning, has periods which are marked by the general prevalence of particular studies among the literati of the time. The philosophers of the early period of Grecian literature, attended chiefly to *mythological morality*. Among the authors of the most flourishing period of Grecian and Roman literature, until the first emperors, *poetry*, *history* and *oratory*, were the prevailing subjects of attention: under the latter emperors, and for some time after, the works of the learned exhibit for the most part the history of *theological controversies*: to them succeeded *metaphysics* and *metaphysical theology*—when these began to decline,

cline, the attention of the learned was awakened to *alchemy, magic, judicial astrology, the doctrine of signatures and sympathies, the Mystic, Theosophic and Rosicrucian theology* and *physiognomy*—then succeeded *classic philology*—this gave way to *modern poetry* and *natural philosophy*—to which of late have been joined the studies of *rational theology, chemistry, the philosophy of history, the history of man* and the *science of politics*.

This very brief and imperfect outline of the progress of human learning, will nevertheless sufficiently illustrate my meaning respecting the injury which physiognomy has suffered from a fortuitous connection with exploded literature. Nothing is more common among mankind than the hasty rejection of valuable opinions from their artificial or accidental connection with other opinions untenable and absurd. The history of theology in particular, and the present complexion of theological opinions in Europe, furnish a pregnant instance of the truth of this remark. It will therefore be sufficient for me to observe at present, that during the space of about one hundred and fifty years from the commencement of the sixteenth century, the authors on the subject of physiognomy were very numerous; and that very many, if not the greatest part of them, treated expressly as subjects of importance either magic alchemy, the doctrine of signatures,

tures, astrology, or the theosophic philosophy. Nor is it any wonder that physiognomy should fall into contempt when the prevalence of more rational literature rejected its contemporary sciences. Some few facts and observations respecting this part of the literary history of physiognomy, illustrative of its temporary connection with the doctrines above mentioned, I shall, with the permission of the Society, throw into the form of an illustration or appendix to this essay, because they are in my opinion not altogether unworthy of notice, but would form a digression too long for the paper itself.

Excepting that physiognomy was fashionable among the authors who treated on the abstruse sciences above mentioned, I do not recollect any thing peculiar respecting this stage of its progress. There were some authors indeed even during that period who treated it free from the absurd conjunction of the prevailing subjects of the day, such as Pere Honorat Nicquet and Claramont. But the observations even of these writers\* are too general, indeterminate and concise, to be of considerable use; and appear rather, as the conclusions of theo-

\* I judge from Gasp. Schott, who has followed Nicquet, and from the quotation in Lavater from Claramontius.

retic lucubration, than the well founded remarks of men conversant with the world. A sufficient specimen of the physiognomic writings of the time may be seen in the quotations which Lavater has selected.\*

About the commencement of the eighteenth century and thence forward, the occult sciences as they are called, had declined considerably in estimation; and the authors who noticed the science of physiognomy forbore to disgrace it by a connection with those branches of supposed knowledge which had formerly been its companions. Among us Dr. Gwither noticed it with approbation in the eighteenth volume of the *Philosophical Transactions*. † Dr. Parsons also chose the same subject for the Croonean Lectures, published at first in the second supplement to the forty-fourth volume of the same *Transactions*, and afterwards (1747) ‡ republished in English: but these as well as the cur-

\* Vol. III. p. 243. French translation, quarto.

† No. 20. These remarks of Dr. Gwither are copied into Chambers's Dictionary and the Encyclopædia Britannica, but without reference. The importance of works of that kind would be increased tenfold by a proper reference to the writers and authorities made use of.

‡ Under the title of "Human Physiognomy explained."

lory observations in Lancisius,\* Haller† and Buffon‡ relate rather to the transient physiognomy of the passions, than the permanent features of the face and body; the well known characters of Le Brun, are also illustrative of the transient physiognomy.

Earlier however than these writers,|| our Evelyn had inserted a copious digression on the subject, in his *Numismata*, a Discourse on Medals; in which there is a panegyric on the science, with several practical remarks and miscellaneous observations. Among the rest, is an analysis of the countenances of many great men whose characters were known. It does not appear however to contain upon the whole any thing worthy of peculiar notice.

The subject seems to have been attended to now and then during this century, but I do not find any thing remarkable concerning it, till the discussion already mentioned, in the Berlin Transactions§ between M. Pernetty and M. Le Catt.

\* The Medical and Anatomical Works of Lancisi were published in 1718, in which there is a letter on the subject of physiognomy, and some observations on the frontal muscles.

† *Physiologia*, quarto, vol. V. p. 591.

‡ *Hist. Nat. de l'homme*. Etat virile.

|| In 1697.

§ Vol. XXIV.

This



This controversy commenced with a dissertation on the advantages and disadvantages of physiognomy by M. Le Catt. In the succeeding volume, (the twenty-fifth) is an answer by M. Pernetty; to which follows a reply by M. Le Catt; and a supplementary reply by the same in the twenty-sixth volume. This contains also three more dissertations by way of rejoinder on the part of M. Pernetty. I have already noticed this discussion so far as it relates to the *definition* of physiognomy. The rest of it, turned upon these two questions:

First, Whether it would be advantageous or otherwise to society, if each individual carried in his appearance, such marks of his character, disposition and talents, as would enable others to collect with certainty these latter, from the former.

Secondly, Whether on the supposition that the science of physiognomy would enable us to discern a part only of the internal character, and mankind in general being but imperfect physiognomists, it would be advantageous to society to cultivate the study of physiognomy.

These questions were agitated, with more prolixity, than their importance to the subject of physiognomy in my opinion deserved. No reasoning *à priori* can possibly determine them with any degree of certainty. Time and experience alone will ascertain what degree of influence

influence any particular kind of knowledge will have upon the manners and characters of mankind. In the mean time it is reasonable to conclude from the analogy of every fact respecting human science, that the *result upon the whole*, of attaining any portion of knowledge heretofore unknown, will not be otherwise than beneficial. Nor is it likely, that mankind will be *permitted* to attain any branch of knowledge, not ultimately conducive to the happiness of the species. Indeed the same questions might have been agitated as preliminaries to every science already known: and if the affirmative in similar cases, must be clearly established, before we proceed to the investigation of the science itself, the course of human improvement might be stopt for ever.

During this controversy, M. Pernetty laid it down as a principle, that no man can be a physiognomist, unless he receives a knowledge of the science originally as a gift from the Deity: and that the faculty of physiognomizing, is not acquired, but innate. It is obvious to remark, that if M. Pernetty's opinion be well founded, it was mere waste of time to discuss either the questions before mentioned or any others relating to the subject; for, which ever way they might be determined, the existence or non-existence of physiognomy as a species of knowledge, not being optional

to the persons addressed, would not be affected by the determination. Such gratuitous and unphilosophical assertions from the supporters of physiognomy, cast a ridicule upon the science itself; and induce mankind to associate the idea of fallacy, even with the well-founded arguments of those who advance them.\* This remark however is not applicable to M. Pernetty alone.

Soon after this controversy, appeared the great work of M. Lavater, dean of Zurich, which has excited no inconsiderable degree of attention in the literary world. The magnificence of the work itself, and the supposed visionary nature of the subject treated, has contributed not a little to make it generally known.† Indeed, so far as I am able to judge, it is (with all its faults) the most important book on the subject, since the days of Aristotle. Sensible that the science is

\* M. Pernetty also somewhere intimates that a physiognomist to form a good judgement, ought to have the dispositions of the persons physiognomized, an opinion, so obviously unfounded that it is strange its absurdity did not strike him at once.

† The German edition of M. Lavater's Work (which I have never seen) was in four volumes quarto. Since this Essay was written, the third volume of the French Translation has appeared, and I have therefore altered my original account of M. Lavater's book by referring to it.

yet in its infancy, M. Lavater professes to give, not a complete, synthetical treatise on physiognomy, but fragments only, illustrative of the different parts of this branch of knowledge; and it must be confessed that his performance, however desultory and unconnected, is in many particulars much superior to those that have preceded.

In conformity with his design, he has rejected the scholastic, systematic method so common among the physiognomists of the last and preceding centuries, and with it he has rejected also their manner of writing, dry, concise, indeterminate, and general: the remarks of M. Lavater on the contrary, are for the most part, precise and particular; and frequently founded on distinctions extremely acute.—He has omitted entirely (as indeed might reasonably be expected from a writer of the present day) the astrological, and similar reveries, so disgraceful to the writers of the generality of his predecessors.—He has (with great good sense) very rarely deduced or confirmed his physiognomical remarks by anatomical or physiological reasonings; which indeed, however important they may prove hereafter, seem even in this present advanced state of our knowledge respecting them, an insufficient foundation to support particular observations.—He has pursued the method first adopted I believe by J.

Baptista

Baptista Porta\* of illustrating his remarks, by engravings, extremely numerous, oftentimes expressive, and upon the whole, tolerably executed even for the taste of modern times.

Nor are these variations from the generality of the authors who have gone before him in the same track, the only particulars which justly entitle M. Lavater's work to a pre-eminence among the books on this subject. His opinions are more evidently the result of actual observation than those of preceding physiognomists. He appears also to have made the science more peculiarly his study than any other person; and (excepting indeed his profession as a divine) it seems to have been the grand pursuit of his life. His attention moreover to *osseal* physiognomy, and the effect of *profiles* and *contours*, evince a comprehension of the subject, much superior to what appears in those who have treated it heretofore. And in addition to these, his style, though somewhat declamatory and digressive, yet forcible and lively; his expressions, frequently precise and characteristic; and the spirit of piety and benevolence which pervades the whole of his performance, contribute not a little to render it highly interesting.

\* The Italian edition of Baptista Porta's *Physiognomy*, is said to have the best cuts.

With all these good qualities however, M. Lavater's work has faults that take away considerably from the deference which his physiognomical opinions would otherwise have claimed. And his imagination has in many instances, so evidently gotten the better of his judgment, that a reader who should take up his volumes for the mere purpose of amusement, would be strongly tempted to reject the whole system, as the fanciful conceit of an ingenious but extravagant theorist.

Among the objectionable parts of his book are the following :

1. The mysterious air of importance, with which (like many of his predecessors) he has clothed his favourite science, and described the whole of the material world as objects of her dominion.\*

2. The fanciful necessity which he imposes that a physiognomist should be a well-shaped handsome man :†

3. His language very frequently too peremptory and decisive ; not warranted by the

\* Vol. I. p. 33—38. Vol. II. p. 89. French translation.

† Vol. I. p. 126.

substance of his remarks, and disproportioned to the occasion.\*

4. His remarks themselves, in numerous instances unsupported by the illustrations, and sometimes, apparently opposite to common observation.\*

5. His too great reliance on single features, as the foundation for deciding on a character.†

6. His premature opinions on the physiognomy of the ears, hands, nails and feet of the human species; on hand writing; on the physiognomy of birds, insects, reptiles and fishes. On none of these can a sufficient number of accurate observations have been made, to warrant the slightest conclusion.‡

7. His

\* Instances of these I think will occur frequently, especially on perusing his *Physiognomic Remarks* on the illustrative engravings, but of these each reader will be the best enabled to judge for himself, until the science shall put on a more systematic form, than the present collection of observations will permit.

† That there is such a thing as homogeneity, and harmony of feature there is no doubt, but the instances of exception are so numerous, and the illustrative cases so scattered and unarranged, that it appears to me injudicious presumption in most instances, to decide positively on the observation of a single feature.

‡ The old physiognomists who (in the spirit of the times) would in no wise have omitted to treat the subject *systematically*, were on that account induced to take into

7. His introduction of objects such as the preceding, is the more singular, from the slight and inadequate attention he appears *bitberto* to have bestowed, on gesture, voice, manner, and the important topic of national physiognomy. All of which he has indeed in some degree touched upon, but far less than facts might have warranted, or their importance demanded. \*

8. The repeated introduction of his own face throughout the course of the work, and the singular remarks he makes on it, although his character may fully justify the truth of them, do not serve to prejudice the reader in favour of his judgment. †

9. The same observation may be made on his singularly fanciful Theory of Apparitions,

consideration every part of the body in its turn. But the manner of M. Lavater, professedly desultory, did not lead him to this; and he has even exceeded the faults of predecessors, by the introduction of physiognomical observations, on the hand writing, on insects, &c. which the present state of physiognomy is very short indeed of being so far advanced as to include.

\* What the fourth volume will include we cannot yet say; but from the short *prospectus* of the subjects, which the editors give in the preface to the third volume, the topics mentioned in the text do not seem to be sufficiently included in the plan.

† Vol. II. p. 201, 202, 203, 204: with these compare vol. II. p. 8. and vol. I. p. 14, 166.

which



which goes near to a revival of the old opinions of the sympathists.\*

10. To these may be added the general character of enthusiasm in favour of physiognomy, which is stamped on every page of the work, and to which indeed a great part of the merit of it may be due. But it certainly has the salutary tendency of setting his readers on their guard against a too precipitate admission of his physiognomical decisions.

Such appears to me the character of a work which altogether does credit to the times as well as to the author.

M. Lavater's book produced an attack upon it, from M. Formey, in the Berlin Transactions for the year 1775. M. Formey having discussed the propriety of the extensive signification given to the term physiognomy by M. Pernetty and Lavater, adopts a definition nearly the same with that which I have taken. He allows that every fibre of the body influences and is intimately connected with the mental character; but he urges, as his principal argument, that our frame is liable to so many accidents by which it may be altered or modified,

\* Vol. III. p. 164. The substance of M. Lavater's hypothesis, Dr. Ferriar has already quoted in Essay on Popular Illusions. M. Lavater's own opinion of it is curious. *Nous parviendrons à établir une hypothèse, digne d'occuper un des premiers rangs dans la classe des probabilités philosophiques!*

that have no connection with the disposition or talents of the person who may be exposed to them, that it far surpasses human skill to distinguish between such modifications of feature as are, and such as are not connected with the mind; and therefore although there may be truth in the science of physiognomy, the Deity alone can be a physiognomist. He observes moreover that our cast of features is liable to be determined by the temperaments of our ancestors lineal and collateral, by education, by diet, by climate, by sudden emotions, &c. so that the determination given to our features by our mental character, may be so involved with, or hidden by accidental circumstances, that it is in vain to attempt the study of a science whose limits are so confined. These objections of M. Formey are worth noticing, although they do not strike me as conclusive on the points toward which he urges them.

Beside this Essay by M. Formey, I know of no other subsequent publication of any moment on the subject. From this historical deduction however of the literary progress of physiognomy, it appears that in whatever disrepute the science may now be fallen, there is scarcely a period to be mentioned wherein any thing of science was known, in which physiognomy had not its abettors and its professors among men of the

the greatest learning and most undoubted abilities ; and that in all probability the chief reasons why so little attention is paid to the subject at present are

First, That it has been treated in conjunction with subjects, now properly exploded as unworthy of attention ; and secondly, That it has been injured by the injudicious assertions and arguments of those who have undertaken its defence.

The learned and the wise however may sometimes be mistaken ; nor should any decisive conclusion be drawn against the use of any thing, from its having been abused. The time therefore may not be far distant, when physiognomy will be reinstated in her rank among the valuable branches of human knowledge, and be studied with that degree of attention and perseverance, which a subject deserves, so essentially connected with the science of man.

## A P P E N D I X.

OBSERVATIONS *on the* TEMPORARY CONNECTION *of*  
PHYSIOGNOMY *with the* OCCULT SCIENCES.

A PROPENSITY to the marvellous has usually been considered as the result of ignorance; and properly, if ignorance be compared abstractedly with knowledge. But there have been periods in the history of human literature, when superior genius and superior attainments have given rise to this taste for the wonderful, and induced mankind to believe in proportion to the want of evidence. The dawn of science in almost every period and nation, has tempted its votaries to advance much farther into the regions of conjecture and hypothesis, than the number or importance of the facts discovered could authorize; and thus, struck with the novelty of the scene, the learned and the curious have adopted with credulous alacrity, the delusive phantasies of imagination, for the genuine offspring of knowledge and experience.

The revival of literature in Europe a few centuries ago, furnishes sufficient proof of the preceding observation. The spurious sciences of astrology, magic, and alchemy; the exploded doctrines of signatures and sympathies, and the motley jumble of the roficrucian and theosophic philosophy enjoyed their respective periods of fashionable attention. Physiognomy too was regarded as of the same family and treated in consort with these branches of fantastic literature; so much, that some brief account of them may be fairly considered

considered as connected with the literary history of physiognomy.\*

*Astrology* seems to have been taught as a subdivision of what we term astronomy from the time of the Chaldeans,† Egyptians,‡ Greeks,§ Romans|| and Arabians¶ down till very late in the seventeenth century.\*\* It is no wonder therefore that men should be led away by prejudices of so long continuance, especially when they were aided by what are now properly regarded as accidental coincidences of events, with astrologic observations; while the more numerous cases of failure, which seemed to contradict the principles of the art, were attributed to the errors of the pen. The ancient name for astronomy itself, especially among the Romans, was astrology, and the professors were named indiscriminately Chaldeans, Genethliacs, Astrologers, Mathematicians and Babylonians;†† and in all probability the physiognomists and genethliacs who abounded under the emperors, were for the most part the same persons, since in those times physiognomy and astrology were both species of the *ars divinatrix*. During the middle ages, astrology was now and then cultivated in Europe, and seems to have been more in vogue than the *illicit* species of divination commonly called magic: the latter had the prejudices of all good christians to encounter, whereas the former was regarded as an allowable application of superior knowledge, and is mentioned even by Thomas Aquinas, in terms rather of approbation than

\* A great deal of what I had intended to include in this appendix, Dr. Ferriar has so well said in his paper on Popular Illusions, that I shall be very brief on those subjects which he has touched.

† Cic. de div. lib. II. Aul. Gell. lib. I. c. 9. and lib. XIV. c. 1.

‡ Cic. de div. lib. I. num. 93. § consule loc. cit. || ut supra.

¶ Golius in Alfragan, p. 253.

\*\* Voss. de Philosoph.

†† Beside the passages before cited, see Not. Gronov. in Aul. Gell. lib. XIV. c. 1. Jul-Firm.

reproof.

reproof.\* The sixteenth and seventeenth centuries however, were of all others the most prolific in astrologers and astrological treatises. Nor was the science confined to such persons as Aulus Gellius † terms “*Æruscatores*” who like the Egyptian Chiromancers of the present day, merely strolled about to procure a scanty and precarious subsistence by imposing on the credulity of the ignorant; on the contrary it was cultivated and recommended by persons of the first learning and abilities and of the highest literary reputation. It is sufficient for my present purpose to notice, that the majority of those who have been mentioned as authors of repute on the subject of physiognomy have treated also diffusely either on astrology in distinct treatises, or on astrology as connected essentially with physiognomy or chiromancy. Indeed this latter branch of physiognomy is scarcely ever treated but astrologically, each part of the hand being assigned to a particular planet. Moreover physiognomists have not only called in astrology in aid of their science, but astrologers have themselves also frequently applied astrology to physiognomy; the same stars in the same situations and aspects denoting (according to them) with every corporature a certain turn of mind.

There is a passage in Strype’s Life of Sir John Cheke, which shews very forcibly the prevailing taste for astrology at that time. “Here then we leave Sir John Cheke, a disconsolate prisoner in the tower now the second time under queen Mary, to repent of his credulity to the words and promises of romanists, and his too much confidence in astrology, whereby he is imposed upon to his destruction. . . . This art of conjecturing at or foreknowing things or events by the position of the stars was about these times exceedingly studied, by both nobility and gentry. Insomuch that Dr. Lawrence Humphrey (who lived in those days and was afterwards a learned professor of divinity at Oxford) in a book which he wrote for the

\* See the Index to his Summa sub voce Astrologia.

† Ubi *scp.*

“ use

“ use and instruction of the gentry, exhorting them to the  
 “ study of divers sciences, observed how much this science  
 “ above the rest was so snatched at, so beloved, and even  
 “ devoured by most persons of honour and worship, that  
 “ they needed no incitements to this but a bridle rather :  
 “ not a trumpeter to set them on but a reprovcr to take them  
 “ off from their heat,” p. 138, Ann. 1556. See also to the  
 same purpose the lives of Lilly and Ashmole, and Dr. Johnson’s life of Dryden. Dr. Joseph Wharton in the first  
 volume of his Essay on Pope observes that Sir Isaac Newton  
 in the former part of his life was addicted to judicial  
 astrology.

Astrology then, appears to have flourished at the same  
 period with physiognomy, to have been treated by the  
 same authors, and to have been regarded as essentially connected  
 with physiognomy ; the disgrace of the former therefore,  
 could not but affect the reputation of the latter.

The same observations, but in a degree somewhat less  
 extensive, may be applied to *magic*. This science (if it may  
 be so called) seems to have been in vogue among every  
 people civilized and uncivilized and in every period, from  
 the Egyptian magicians Jannes and Jambres, and the  
 witch of Endor, through the classical period of Roman  
 literature, and down to the more technical magicians of the  
 sixteenth and seventeenth centuries.

The scriptural magicians, as well the witches of Horace,  
 Virgil and Lucan,\* appear to have been chiefly if not  
 entirely necromantic ; but the refinement of the period just  
 mentioned has produced a variety of deviations and subdivisions  
 of the subject, which will of themselves sufficiently  
 shew the great attention paid to magic at that time.

Magicians are distinguished † into diviners with, or  
 without communication or conjuration of spirits. Magic

\* The process is very minutely described in Lucan, lib. VI.

† I owe a part of this enumeration to my deceased friend John  
 Henderson of Pembroke College, Oxford.

of the first kind (i. e. by the help of spirits) is either 1. when a spirit voluntarily attaches itself to a man—this is indifferent; 2. when a man conjures them, either without compact, which is held indifferent, or with compact, which is evil if with evil spirits; though indeed most condemn all kinds of conjuration. 3. By divine commission, as in the case of the prophets, apostles, &c. this of course is held good.

- Magic of the second kind (i. e. without spiritual communication) is either 1. The working of wonders, which may be prestigia, leger de main, strange experiments in physics. 2. Divining from natural signatures, or 3. from the stars (i. e. astrology), or 4. fortilegy, which includes the divination by chances of all kinds, Geomancy, Coskinomancy, Clidomancy, &c.

The voluntary attachment of spirits (to which may be referred the second sight) was commonly deemed unfortunate, and all magic but the divine, unlawful.

The conjuration by means of spirits was fourfold: I. Necromantic, when either 1. an appearance of a dead person is raised; or 2. when a spirit is forced into a dead body. II. By circulatory invocation, when at due astrological hours and with proper ceremonies spirits are made visible round a circle. III. By opening a consecrated book on the name of the spirit wanted. IV. By calling at a sign a compacted familiar; this last is usually termed witchcraft.

To these may be added the consecrated glass or crystal in which, on invocation, may be seen the persons or things required; the operations on the bodies of absent persons by means of images of wax or clay; \* and that species

\* This iconopoietic part of magic seems founded on the doctrine of signatures.



of witchcraft which is employed to counteract the malicious designs of those who injure others by the assistance of a familiar; persons who profess this are in England termed *white witches*.\*

During the period so often mentioned (the sixteenth and seventeenth centuries) this pretended science was commonly received, and by many eagerly studied. The books published respecting it were numerous, and among the learned who gave credit to it were some of the first names that literature could boast. So prevalent indeed was the belief in magic, that there are few European nations whose criminal code does not enumerate the practice as an offence.† What is particularly however to the purpose here, is that many authors of note on the subject of physiognomy, treated also on magic both natural and supernatural, such as Baptista Porta, Schottus, Alstedius, Campanella, Cardan, Paracelsus, Fludd, &c. a part therefore of the disgrace to which physiognomy has been exposed may be attributed to this circumstance among others.

The same period of the fifteenth and sixteenth centuries, abounded also in *alchemists* and *alchemical writers*. The present state of chemical knowledge induces us to conclude with great probability that the researches of the alchemists

\* The exhibition of absent persons by a consecrated glass is among the fancies in Dr. Dee's Works; the fourth book of Cornelius Agrippa's Occult Philosophy, is on the combined plans of the consecrated book and circulatory invocation; the various kinds of divination may be found in the same author's treatise *De vanitate scientiarum*, in which physiognomy is enumerated among the divinatory arts.

† The instructions for examining a witch in Dalton's Country Justice, p. 318, are too long to be inserted here but are extremely well worth perusing.

concerning the philosopher's stone, or powder of projection which was to turn all base metals into the noble ones, and concerning the grand elixir, or universal medicine\* which was to procure a perpetuity of life, did not succeed. The more likely theory which must account for the facts related is, that in many instances they deceived themselves, and that some of them wilfully deceived others. Of all the branches of natural philosophy there is none so engaging as chemistry. The vast extent of the science, the variety of unexpected phenomena it produces and explains, the number of uses it possesses, and the superior stock of real knowledge it affords to those who cultivate it, are circumstances that would operate still more strongly in the infancy of the science, than even at the present day. Nor is it at all surprizing that appearances so wonderful approximating so nearly to an absolute creation of one substance out of another, as the revivification of an ore, a calx, or a solution, into the brilliancy of a perfect metal, should induce the votaries of the science to extend their hopes very far beyond the scanty limits of their actual knowledge. As Kepler remarked of astrology† that it was the foolish daughter of a wise mother, so also may it be said of alchemy. To the vain sciences, however, of astrology and alchemy, are we indebted for the present advanced state of astronomy and chemistry.

Rousseau somewhere remarks that a true philosopher has frequent occasion to say *J'ignore*, but very seldom ventures to pronounce *c'est impossible*. This remark in my opinion will

\* The grand elixir or universal medicine, among the earlier alchemists seems to have been no more than a figurative expression for the philosopher's stone, because this latter cured all the (metallic) diseases of the imperfect metals, and purified them into the perfect and indestructible metal gold. About the time of the origin of the Rosicrucian fraternity, and after the writings of Van Helmont, it appears to have been considered literally as a medicine.

† Præfat. ad Tabul. Rudolphin, p. 4.

apply to alchemy. It is as I have said before, highly probable that the old alchemists either meant to deceive their readers, or were deceived themselves: but after the solemn protestations which many of them have made (without any apparent motive to deceive) of their having succeeded in the *confectio lapidis*; after the high praises given to their fidelity in other respects by Boerhaave, and his caution on this subject in particular;\* after the hesitation of the illustrious Bergman himself; † and the possible conclusions deducible from the modern doctrine of metallic acids, and the coagulating and metallizing portions of phlogiston, and after the inexplicable fact (among others) of the fixation of mercury in the experiments of the late unfortunate Dr. Price, ‡ a chemist even in the present state of knowledge may say without ridicule concerning some of the alchemical assertions on this subject, *J'ignore*. But whatever might have been the good or ill success of the alchemists in their pursuit after the grand arcanum, the expectation of success, joined with the novelty of the phenomena that occurred in the course of their experiments,

seems

\* Boerh. Chem. part II. sect. "On the usefulness of chemistry in alchemy:" which contains the best general summary of the doctrines of the alchemists that I recollect to have seen.

† Hist. Chem. Med. Ævi. § 2.

‡ "An account of some experiments on gold, silver, and mercury, made at Guildford in May 1782, in the laboratory of James Price, M. D." I take for granted the truth of the *facts* as there related, which indeed cannot be disputed considering the respectability of the persons present, without the most gratuitous scepticism: and on that supposition, whether the gold and silver were formed, or whether they were merely precipitated from the mercury, the exhibition of these two former metals under the circumstances, ranks among the most curious, the most inexplicable facts of ancient or modern chemistry. The gratuitous, unfounded, and I may say ungenerous supposition, that a person of Dr. Price's knowledge, rank and character should so absurdly be guilty of wilful and puerile charlatanism, is to me full as inconceivable as any explanation of the matter

seems to have attracted a great number of followers from a very early period. Suidas\* mentions that the Emperor Dioclesian ordered all the books of chemistry to be burned, lest the Egyptians learning from them the art of preparing gold and silver should thence derive resources to oppose the Romans. Pope John XXII. in the fourteenth century, † thought fit to stigmatize the alchemists as impostors. In England the study was so much in vogue that the stat. 5 Hen. IV. Ann. 1504 makes it felony to use the art of multiplying gold and silver. ‡ In the 35 Hen. VI. however letters patent were granted to several people, whereby they were permitted to investigate an universal medicine, and to perform the transmutation of other metals into gold and silver, *non obstante* the former statute; || this last statute remained in force till 1689, when it was repealed (as is said) through the private interest of Mr.

hitherto given, can be: nor indeed has any one yet presumed to conjecture at the mode of deception; nor was it ever till that time conceived that mercury usually did or even could, bring over with it in sublimation so large a proportion of gold and silver. That a person of Dr. Price's accuracy should refuse to publish a process so extraordinary, till he had ascertained it by experiments scrupulously repeated, I can easily believe; and that not succeeding in the repetition of an experiment so anxiously expected, and in which his reputation was so much involved, a person of his known high spirit should too hastily have recourse to suicide as a means of avoiding general disgrace, carries with it nothing violently improbable. Caution in giving credit to any thing very extraordinary is certainly a mark of good sense; but the spirit of incredulity, is of all other spirits the most opposite to the spirit of philosophy.

\* Suidas voce *χημικά*. Watson's Essays, vol. I. p. 14.

† In the Bull *Spondens quæ non exhibent*, &c. Bergman Hist. Chem. Med. Ævi. § 1. Kircher Mund. Subter, lib. XI. sect. 4. cap. 1. Watson vol. I. p. 22.

‡ Watson ubi sup.

|| Ibid. p. 24.

Boyle.\* The faculty of medicine at Paris had also condemned alchemy in the year 1609.†

The fallacious experiments however of the later alchemists; the methods they introduced to deceive the credulous† and defraud them of their property; the mysterious and affected language in which they delivered their instructions; the connection of the alchemical doctrines with the rosicrucian and theosophic jargon; and the general prevalence of more rational philosophy and more accurate chemistry, contributed to bring them into disgrace, and opened the eyes of their readers to the vanity of their pretensions.

The disgrace of alchemy, has of course affected its consort sciences; among these physiognomy must be reckoned, for Hermes Trismegistus, Rhafis, Avicenna and Albertus Magnus, rank among the physiognomists as well as the alchemists; so also do the theosophers Paracelsus, Fludd and Behmen. Moreover, both alchemy and physiognomy have been treated as equally real sciences by Porta, Schottus, and Alstedius, and indeed by the generality of popular compilers of the times.—The same accusation therefore which may be laid against magic and astrology with respect to physiognomy, will apply also to alchemy.

Among the other singular opinions of the æra in question, was the *Doctrine of Signatures*. This was of two kinds: some philosophers holding that plants and minerals, and even animals (particularly the former) had marks or signatures impressed by the hand of nature, indicating the therapeutic uses to which the things themselves might be applied; while the theosophic mystics (comprehending al-

\* Ibid. and Life of Boyle prefixed to the folio edition of his Works, p. 83.

† Bergman ubi sup.

‡ Such as having hollow spatulas to stir the mixture, and concealing gold in the hollow part; having false linings to the crucibles; using lead or mercury containing a slight amalgam of gold; concealing gold in the cover or the luting, using charcoal moistened with a solution of gold, &c.

most all the chemical philosophers of the day), went still farther, and adopted the notion that every substance in nature, had either external signatures immediately discernible, or internal signatures which fire or menstrua alone would bring to view, denoting its connection with some sidereal or celestial archetype.

The latter division will of course rank among the reveries of the theosophists whom I shall notice presently. The former, almost as fanciful, and to the full as unfounded, was an opinion adopted by a very large class of literati who did not fall into the other notions of the mystics. Indeed the doctrines of signatures in this sense, can hardly be considered as originating in this æra; traces of its adoption being to be found among the writings of some of the wisest of the ancients: thus Pliny the elder\* mentions the marble *ophites*, so called from its being spotted like a serpent, as sovereign against the bite of that animal, and the *hematites* or blood-stone, as a remedy for hemorrhage.

In ascertaining the supposed medicinal effect indicated by these imputed resemblances, the philosophers of the period in question do not seem to have been very scrupulous. Among plants for instance, some were valued for their resemblance to certain parts of the body, and regarded as universally good against the diseases of those parts; such as the roots of squills, walnuts, cucumber, &c. for disorders of the head; liverwort for those of the liver: dentaria, for the teeth: orobis, satyrion, &c. as aphrodisiacs: while others were deemed efficacious against particular complaints, on account of their resemblance to the disorder itself as pilewort, against the hemorrhoids: the echium or scorpioides, the ophioglossum and the ophioscorodon were prescribed as remedies against the venomous bites of these animals on account of some fancied similitude to scorpions and serpents; while the aconite and other poisonous plants were

\* Hist. Nat. lib. XXXVI.

recommended in similar cases, because one poison was thought to drive out another.

In the present state of knowledge, we smile at the advancement of opinions so slightly founded and conclusions so illegitimate; and are apt to despise without much investigation the notions of those who could seriously propound such fanciful absurdities. Unluckily for physiognomy, her votaries were among the foremost in defence of these doctrines which may be seen in their full extent in the writings of J. Baptista Porta and Crollius: not to mention the treatises on the Signature of Things by Paracelsus and Jacob Behmen, where similar notions are advanced in conjunction with the reveries of alchemical and mystical theology, and physiognomy itself is treated at length by the former as a branch of the philosophy of signatures. Among other physiognomical writers also who have supported this doctrine of signatures, may be reckoned Cardan\* Campanella† and Alstedius.‡ The first rule in the *Medicina Chemica* of the latter is as follows. Reg. 1<sup>a</sup>. *Signaturæ rerum faciunt plurimum ad indagandas vires medicamentorum. Audiamus hæc de re Duncanum lib. IV. de Therapeutica cap. VIII. Præterea inquit ad explorandas et indagandas vires Medicamentorum, Paracelsus novam quandam Physiognomiam et Chiromantiam excogitavit, et ex figuris rerum occultas vires mæniendas esse putavit. Nam autore Paracelso (libro de figuris rerum, et libro de Persicaria) natura omnia signavit et latentes vires cutis signis expressit nobisque manifestavit. Signaturæ autem aliæ externæ sunt, ut forma figura lineamenta et similia: aliæ internæ, spagiricæ et artificiosæ preparatione introductæ; veluti quæ partis similitudinem habent ei potissimum conferunt, ut hepatica hepatis; euphrasia oculis; baliacabum vesicæ; pulmones vulpis, pulmonibus, &c. item lapidosa, et quæ lapidosum*

\* De Subtilitate. lib. VII.

† De Sensu Rerum et Magiâ. Gassarel Curiositates in auditæ. cap. V.

‡ Encyclop. fol. vol. II. p. 571.

*quid proferunt (ut Saxifragia), calculo; herba perforata, ut hypericon, vulneribus.* So also in another place\* he lays it down, *omnis planta suam ipsius insitam virtutem, certo et infallibili signo ostendit homini.* Alsted is sufficient authority for the opinions of his day, as his compilation was in great vogue and really possessed great merit. It was no small praise that Leibnitz thought so well of the work, as to have entertained at one time an intention of revising and republishing it. When notions like the preceding came subsequently to be rejected, it is no wonder that physiognomy thus artificially connected with them should be rejected also. †

Of the still stranger doctrine of *sympathies*, I have little to say; partly because I do not find any writer expressly physiognomical who has treated on the subject, except Goclenius; and partly because Morhoff's Chapter de *qualitatibus occultis*, ‡ together with the observations of Dr. Ferriar on this head in his paper on Popular Illusions will furnish sufficient information. The theosophers however, in this as in the doctrine of signatures extended their

\* Ibid. lib. XIII. Phys. part V. cap. 2.

† Boyle seems to have adopted the signatural opinions from his favourite authors the chemical (or rather alchemical) philosophers. Thus in his treatise entitled "Some Considerations touching the Style of the Holy Scriptures," he says, "And as chemists observe in the Book of Nature, that the simples that wear the figure & resemblance (by them termed *signature*) of a disordered part, are medicinal for that part of that infirmity whose signature they bear, so &c." It is upon this signatural principle I presume, that among his medicinal experiments he so often prescribed horse dung for the colic; album græcum for the hemorrhoids; sheep's bladders for the diabetes; the application of fresh blood in erysipelas; turmeric, saffron and fresh sheep's dung in the jaundice; dead men's bones for the ague, &c. The doctrine of signatures was not peculiar however to the chemical philosophers, for Porta Crollius and Cardan cannot be reckoned among them; and the same notion was adopted by Dr. Henry More, the opponent of the chemists. See his *Antidote against Atheism*, book II. chap. 6.

‡ Polyhist. tom. II. lib. II. part II. cap. 2.

notion



notion of the subject far beyond the mere medicinal application of it, including under the denomination of sympathy the consent or connection between celestial and terrestrial objects. Indeed, the term itself has been variously applied; as 1. to the cure of wounds by the application of some medicinal salve or powder (called weapon-salve or sympathetic powder) to the instrument which inflicted the wounds: 2. to the supposed cure of diseases by means of the magnetic effluvia: 3. to the influence beneficial or otherwise of certain plants over others growing within their reach; to the poisonous effect of this kind attributed to aconite for instance, and the antipathy of the oak and the olive: 4. to the unknown (but supposed real) connection between certain plants and artificial preparations of their produce, as the fermentation of wines when the vine flowers: 5. to the indirect affection of one part of the body when another distant part is immediately affected, without any apparent direct connection; as the stomach and the uterus: this is the modern medical doctrine of sympathy, and was not unknown at the period in question: 6. to the connection between certain remedies and particular parts of the body, as cantharides and the bladder: this is the doctrine of specifics which so far as it is not signatural, and facts warrant it, may be admitted: 7. to the connection between celestial and terrestrial spheres and orders of beings and to the mutual influence between human and astral bodies; the influence of the former over the latter being the ground-work of magic according to the theosophers; and of the latter over the former of astrology: 8. to the influence of maternal imagination over the fœtus; a subject that deserves more consideration than has hitherto been given it: 9. to the communication of hysterical and hypochondriacal diseases by their effect on the imagination of the beholder; which appears to be frequent among the cases of supposed affection by animal magnetism in our time: 10. to the effect produced by the talents, passions and

dispositions in the form, and features of the human species. The modern *ethical* application of this doctrine, to the subject of compassion, or the generation of moral sentiments I have nothing to do with. Hence the doctrines of signatures and sympathies appear to have been in many cases intimately connected, the former in such cases being considered as the exponent of the latter. To the doctrines of signatures and sympathies are owing in my opinion, the uncertain and popular notions of the efficacy of amulets and specifics, and the effect of the mother's imagination and inclinations on the fœtus. It is not uncommon for the absurdities of the learned in one century to become the current opinions of the vulgar in another.\*

I proceed now to notice some few circumstances respecting that singular class of mystics† usually known by the appellation

\* The Pythagoro-platonic cabalists, at the head of whom with us was the learned and excellent Dr. H. More, were almost as fanciful as the theosophic mystics. His Discourse on the Immortality of the Soul contains a strange collection of absurd relations. See that discourse for instances of signatures on the fœtus, out of Ficinus and Sennertus, book III. chap. 6; and in chap. 13. there are some remarks on the sympathy between the earthly and the astral body, which More is almost inclined to adopt from Paracelsus. Mr. Boyle's medicinal receipts contain recommendations of amulets; and in his Treatise on the Usefulness of Philosophy, he strenuously insists on the sympathetic cure of wounds and the usefulness of the sympathetic powder both from his own experience and that of others. The sympathetic powder was usually some styptic, such as dyed green or white vitriol.

† Although among the *Pagani* may be reckoned as mystics; 1. the initiate into the mysteries; 2. the Pythagoreans; 3. the Platonists; 4. the Plotinians with Jamblichus and Porphyry:—among the *Jews*; 1. the Cabalists; 2. the Platonists or Philonists; yet the term has usually been appropriated to certain sects since the introduction of, and professing *Christianity*: as 1. to the first Gnostics; 2. the eclectic Gnostics; 3. the Ascetics, Eremites and Monks; 4. the Theosophers, divisible into Paracelsians, Fluddists, Behmenists and Rosicrucians; 5. the disciples of Molinos (i. e. Quietists), Janсениs, Bourignon and Guion; 6. the Quakers, Bohemian brethren Herrnhutters or Moravians, and the Methodists, whether

Antinomian,

appellation of *Theosophers* or *Philosophers* by fire: at the head of whom stand Theophrastus Paracelsus, Robert Fludd, and Jacob Behmen, physiognomists of no small consideration, who adopted with singular avidity, and propagated with persevering industry, almost every ridiculous opinion which the extravagant philosophy of the times had previously introduced; adding to these, various theories of their own fanciful production equally ridiculous and unfounded with the wildest notions of their speculative predecessors. Somewhat like the gnostic christians of old, they were eager to press their mystic theology into an unnatural connection with their philosophical reveries; and hence the motley assemblage of religion, alchemy, magic, astrology, &c. so strangely united, and still more strangely delivered in the writings of this sect.

Paracelsus, a native of Zurich in Switzerland, seems to have been the first who in the beginning of the sixteenth century gave life and reputation to the theosophic philosophy; opposing with the greatest violence the scholastic and metaphysical doctrines of the literati of that time, and

Antinomian, Calvinistic or Arminian; all of this class (like the preceding indeed) hold the necessity of spiritual regeneration (by many called the new-birth) or total change of heart and disposition by the preternatural imparting of Divine Grace and immediate operation of the Holy Ghost, not merely suggesting to the mind religious acts, but working divine habits in the soul. A doctrine not obscurely delivered in the articles of the church of England. 7. The followers of Dr. H. More, Mr. Norris, &c. 8. the disciples of Engelbrecht, Swedenborg, &c. besides other classes of less obvious occurrence. The christian mystics may be divided into two general classes; 1. the purely theological, as the Asketics of all kinds, Quietists, Quakers, Moravians, Methodists, &c. and 2. the philosophico-theological, or those who connect their own philosophical theories with their mystic theology, such as the Gnostics and Theosophists. Perhaps also under this class may be included the Swedenborgian and other similar *visionaries*. But however they may differ in their respective systems, immediate revelation and divine union is in general the connecting principle of their theology, and the analogy, resemblance or connection of all spheres and orders of beings of their philosophy.

abusing

abusing with equal virulence the Galenical practice of medicine, then universally prevalent. The increasing tendency about that period to alchemical studies, and the great success which in certain cases the chemical remedies of Paracelsus met with, procured him many followers both during his life and after his decease. Early in the seventeenth century, Dr. Robert Fludd an English physician, and Jacob Behmen a German tailor (or shoe-maker) published their works, containing (so far as their meaning could be discovered) doctrines and speculations very similar in their general complexion and tendency to the dogmata of the Paracelsian philosophy; but with variations of such singular eccentricity, and with style and manner so perfectly anomalous, that I should be strongly tempted to give some farther account of the lives, tenets and dialect of these enthusiasts (each differing in some degree from the other), had not this appendix extended too far under my hands already.

To this class of philosophers belong also the *Rosicrucian fraternity*, who first began to be noticed about the commencement of the seventeenth century, and professed the same general opinions, and made the same theological and alchemical pretensions to immediate revelation, the philosopher's stone and the universal medicine with the Paracelsian theosophists. They were said moreover (whether truly or falsely has been doubted) to have framed themselves into a mystic society, pretending, like the free masons of modern times, to certain secrets as the bond of union divulged only to the initiate. The limits of this appendix, compel me also to decline any farther mention of this extraordinary sect. Those who wish for farther information on the general subject of the theosophic mystics (one of the most curious which the history of philosophy affords, may consult the very admirable work of Brucker\* who with a

\* Hist. Crit. Philosophiæ. vol. IV. p. 644, et seq. and the authors there quoted. See also Mosheim's Eccles. Hist. vol. IV. p. 16, 264 and 476.

degree of labour and skill to be appreciated only by an examination of the original authors, has collected together a set of propositions which may fairly be regarded as characteristic of the opinions of the theosophic philosophers, so far as the obscure jargon of their principal writers will afford a glimpse of meaning. This comparatively lucid exposition of ideas that in Fludd and Behmen\* particularly, escape all common research, will not perhaps be unacceptable to the society. The notions then, common to all the theosophists are as follow.

1. All beings derive their origin from the divine essence, and are emanations from that infinite source; and hence every thing exhibits the Deity himself expanded to our view, and manifested in his creatures by different modes and stages of evolution.

2. Hence by a similar order and series of revolutions, all things thus originally evolved will return to their first source.

3. This is eminently true of the human soul, or that immortal spirit which dwells in the mortal body—this spark, derived from the boundless mass of infinite light and united to man, still retains some marks and properties of its origin, and will again return to that eternal center of Deity from whence it first proceeded—knowing therefore its origin, and the spring from whence it first flowed, it should strive to reascend; that with a pure and continual desire

\* Behmen in particular has had many followers in England, the famous Mr. William Law left a magnificent posthumous edition of Behmen's works; a Mr. Taylor abridged them also for the use of English readers in a view of the Teutonic philosophy, and all Behmen's writings have been translated into English, besides Law's edition: neither do the modern Swedenborgians reject him. Godfrey Arnold in his *Hist. et Apolog. Theologiæ Mysticæ* ed. Francofurt. p. 597. says that Behmen's Treatise on the three Principles was translated into English ann. 1648, at the expence of Charles I. and with the strong approbation of Dr. H. More. Brucker's View of Behmen's Doctrine is taken from the two or three first pages of that work.

earnestly

earnestly seeking after its source, it may at length enjoy an union therewith, in silent acquiescence and supreme delight.

4. Hence the bond of flesh must be thrown off, and indulgence denied to corporal inclinations; nor ought the soul to be detained by or attached to the ideal disquisitions of REASON, but rejecting her delusive inquiries, to be cleansed and purified by penitence and resigned submission, in prayer and intercession, piously expecting the divine illumination, and absorbed in anxious desire for its approach. That in this consists true wisdom, not to be learnt from the writings of Aristotle, or the philosophy of the Gentiles, but from the internal and immediate illumination of the Holy Spirit; which must be waited for in the sabbath of the soul, freed from the clog of all internal or external exertion.

5. This may be regarded as the more certainly true, since God, the fountain of all things, hath not only so impressed the likeness of his essence upon the human race, that man resembles it in all its attributes, and (when duly cultivated and disposed), in the inmost recess of his soul can behold and contemplate it; but he hath moreover so communicated that likeness to every substance and creature, that when once we have attained to a knowledge of the Deity by an inward contemplation of his image, we may look downward from thence to the types and signatures of created beings and comprehend the wonderful bond of union, and mutually-communicated operation and influx by which all orders of existence are connected.

6. In the knowledge of this connection and divine influx upon inferior beings, and of the rank and power of the divine emanations, consists *natural magic*; which whoever hath learnt, is able to exercise authority, not only on the elements, but on the mundane spirits which preside over them; to produce wonderful effects; to discover hidden mysteries, and to penetrate into the very abyss of nature.

7. Since

7. Since however, this divine emanation and influx upon the inferior beings of the mundane system, is communicated by means of sidereal irradiations, much of the theosophic philosophy, consists in being acquainted with the *true science of astronomy*; with the harmony and connection between the stars, human bodies, animals, earth, minerals and plants.

8. Since the same (plastic) spirit is concealed in all these, and the marks impressed on their external appearance are analogous thereto, the *signatures of things* are of no small moment in discovering their internal nature and properties, and are therefore to be studied by the theosopher; who must apply fire as the key to unlock the recesses of nature, and thus by the assistance of chemistry lay open the internal constitution of minerals, stones and metals.

9. By means of this admirable branch of wisdom an adept is able to transmute metals and perfect them to the utmost, and to preserve and continue life itself to an endless immortality.

10. Hence then it appears that man consists of three distinct parts, a spark or particle of the divine essence; an astral spirit; and a corporeal substance; that as long as he continues in bondage to the body, he participates of the condition of brutes; by the astral spirit he is thence recalled to humanity; and by the spark of the divine light which he possesses, he is taught to ascend up to God the fountain of light. The soul thus gets quit of that leaven of sin which lies concealed in the body, and which defiles the astral spirit, and seeks the pure centre of existence and the ultimate term of felicity.

11. By the influence and extension of the divine sciences and the communication of wisdom from on high, this supreme felicity may commence even in this life; to which the doctrines of the theosophists point the way.

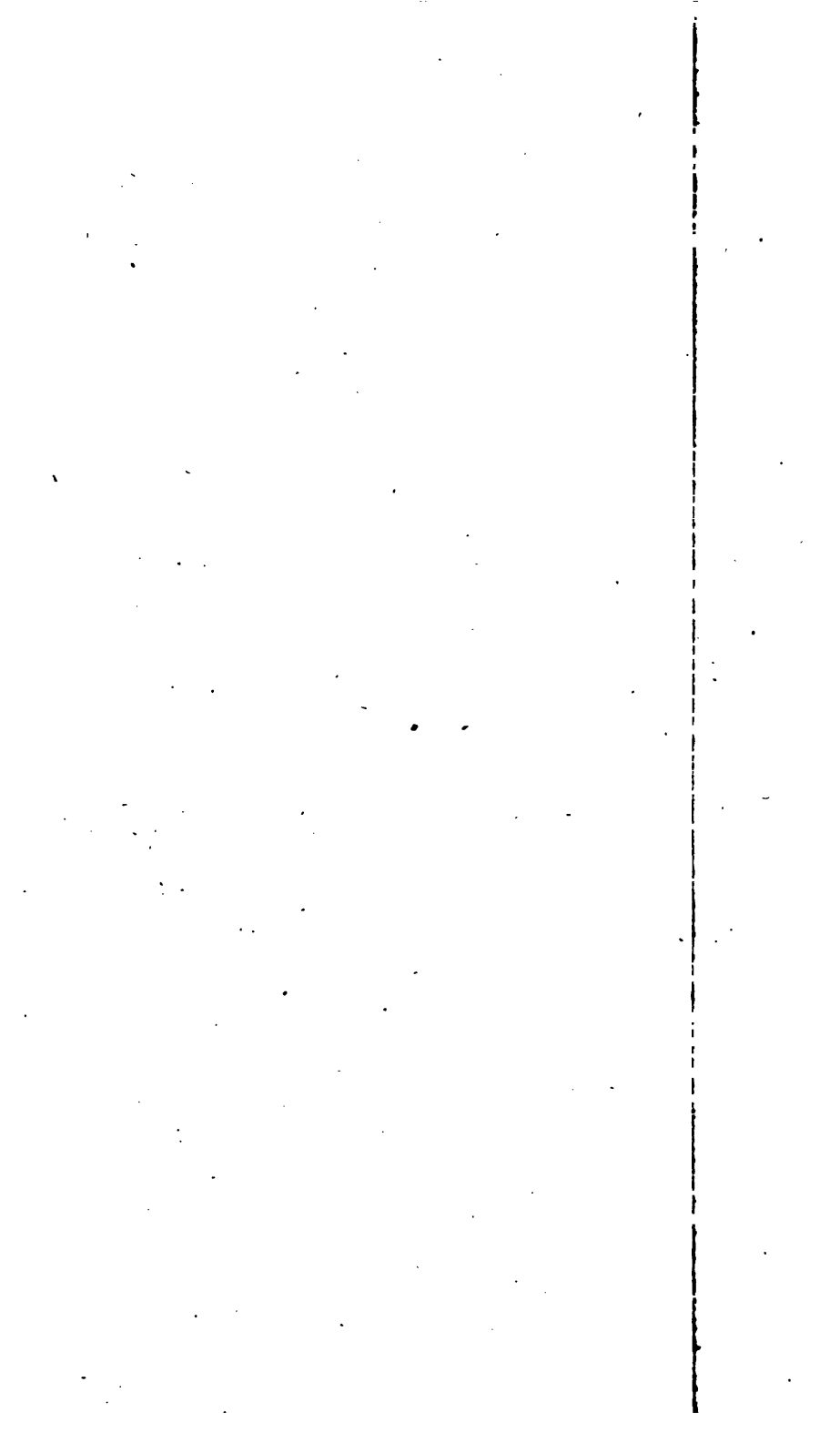
Such are the principal tenets common to the theosophers of whatever class: their respective peculiar reveries, would lead me much too far, were I to attempt the enumeration;

tion ; but however ſtrange and fanciful their *opinions* may be, theſe are not ſo ſingular as the language and manner in which they are delivered. Of theſe opinions indeed ſome are not very diſſimilar to ſuch as had been advanced aforetime among the Gnoſtics, Platonics, and Chriſtian Cabaliſts ; although, excepting ſuch information as converſation might ſupply, there is no room to ſuſpect that Paracelfus and Behmen drew from thoſe ſources, whatever Fludd might do ; and even of him, it cannot be proved that he borrowed from any preceding writer.

Upon the whole of this enumeration then, it appears that the defenders of phyfiognomy, the profeſſed teachers of the ſcience, have been either teachers and defenders of alchemy, magic, aſtrology, or theoſophy, or all of them ; and of courſe that it was utterly impoſſible that theſe doctrines ſhould be rejected without ſome contamination on the character of the companion ſcience of phyfiognomy.\* A circumſtance which to have omitted would have rendered, the ſlighteſt ſketch of the literary hiſtory of phyfiognomy groſſly deficient.

\* It happens rather unfortunately for the ſcience in queſtion that even in this day her principal votary (Lavater) ſhould be generally conſidered as a ſtrenuous ſupporter of a ſect of myſtics. Vid, Mirabeau's Secret Hiſt. of the court of Berlin.







*El Alcazar de Amigot del.*



*El Alcazar de Amigot del.*

DESCRIPTION of a GLORY; by JOHN HAYGARTH,  
M. B. F. R. S. *Lond.* F. R. S. and R, M. S.  
*Edinb.* and Fellow of the *American Academy*  
of Arts and Sciences. Communicated by Dr.  
*Percival.*

READ MARCH 13, 1789.

ON the thirteenth of February 1780, as I was returning to Chester, and ascending, at Rhwalt, the mountain, which forms the eastern boundary of the Vale of Clwyd, I observed a rare and curious phænomenon. My ingenious friend Mr. Falconer, has given, from my description, an exact representation of it, in a drawing which accompanies this paper. (See plate IV.)

In the road above me, I was struck with the peculiar appearance of a very white shining cloud, that lay remarkably close to the ground. The sun was nearly setting, but shone extremely bright. I walked up to the cloud, and my shadow was projected into it; when, a very unexpected, and beautiful scene was presented to my view. The head of my shadow (see plate IV.) was surrounded, at some distance, by a circle of various colours, whose centre appeared to be near the situation of the eye, and whose circumference

cumference extended to the shoulders. The circle was complete, except what the shadow of my body intercepted. It exhibited the most vivid colours, red being outermost : as far as can be recollected, all the colours appeared in the same order and proportion that the rain-bow presents to our view. It resembled, very exactly, what in pictures is termed a *glory*, around the head of our Saviour, and of saints : not indeed that luminous radiance, which is painted close to the head, but an arch of concentric colours, which is placed separate and distinct from it. As I walked forward, this *glory* approached or retired, just as the inequality of the ground shortened or lengthened my shadow. The cloud being sometimes in a small valley below me, sometimes on the same level, or on higher ground, the variation of the shadow, and *glory* became extremely striking and singular.

To add to the beauty of the scene, there appeared, at a considerable distance, to the right and left, the arches of a white shining bow. These arches were in the form of, and broader than a rain-bow : but were not completely joined into a semicircle above, on account of the shallowness of the cloud. When my chaise came up, I could observe no peculiar appearance round the shadows of the postillion, horses, or chaise. But the postillion was alarmed, to an uncommon degree, by this very singular apparition :

tion: which indeed, might excite terror, or delight, in the beholder, according to the disposition of mind with which it was viewed.

Several appearances have been described by philosophers, in some respects resembling what I saw, but not exactly the same. The arch in size, situation and colour was most exactly the *glory* represented in some pictures, and is manifestly the archetype whence it has been copied by a painter. Indeed such a phænomenon is well adapted to excite religious awe and reverence.

When I returned into the chaise, a bright radiance appeared close to its shadow, but no separate coloured circle was formed.

In order to investigate the cause of these curious appearances, on optical principles, it may be useful to note some peculiar circumstances. The cloud was specifically heavier than the air of that region where it was placed: for, it descended, with considerable velocity, down the side of the mountain. It was very close and shallow, being, in part, compressed by its own weight, the air at that altitude being too rare to suspend it.

I have seen, at other times, but not frequently, clouds of the same appearance. On the 28th of November 1780, I saw some clouds which exactly resembled those in which the *glory* was observed, but had not leisure to approach them.

These were remarkably close, compact, and shallow on the mountain; but, in the adjoining valley (of Mold) they were thin, rare, and deep. In the valley, the atmosphere and the clouds seemed to be of the same specific gravity. The cloud on the mountain had a shining brightness, where the sun shone upon it, but was extremely black where shaded by other clouds.

In some cases, the cloud, in which a similar appearance has been observed, was thought to be composed of frozen particles. It probably was so in the present instance. For, some hours later, the same evening, being on horse-back, and passing through a like cloud, icicles had formed on my hair, which by the motion of riding, produced a sound, like the ringing of distant bells.

No coloured arch, like a rain-bow, I believe, has ever appeared in a hail or snow shower: the frozen drops are probably too opaque, too distant, and too large to exhibit such colours. But the proximity and the minuteness of the frozen particles, in the cloud above described, might probably allow the rays of light to be reflected, and refracted in a coloured circle. Experiments on thin frozen surfaces in a prismatic form, or on small frozen particles of water, might successfully illustrate this curious subject. Glass incrustated with ice may afford some observations. And the sun shining on a surface of snow,  
covered

covered with a hoar-frost, exhibits, as I have lately remarked, beautiful brilliant points of various colours, as, red, green, blue, &c. reflected and refracted at different angles; which, by attentive observation, might perhaps explain the cause both of the *glory*, and of the bright arches above described.

EXPLANATION *of the* PLATE.

- CC. The white cloud.  
AA. The shining arches.  
SS. The shadow.  
GG. The glory.
- 

EXPERIMENTS *on the* FUSION *of* PLATINA; *by* Mr.  
THOMAS WILLIS, *Chemist, at the Hermitage,*  
*London. Communicated by* Mr. THOMAS HENRY,  
F. R. S. &c.

READ AUGUST 13, 1789.

TO MR. THOMAS HENRY.

LONDON, JULY 18, 1789.

S I R,

I HEREWITH inclose you a few experiments on platina, and beg the favour of you to lay them before your truly commendable society. I should have been happy could I have succeeded in rendering this extraordinary metal malleable,

H h 2

as

as it would have been of the greatest consequence in constructing optical instruments, on account of its not being affected by the air. I do not despair of succeeding, as my intention is to pursue this object still further, and I shall with pleasure communicate my future processes to the public through your most excellent institution.

I am, SIR,

Your most obedient, &c.

THOMAS WILLIS.

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I OFFER the following experiments to the public with a view to promote further researches into the properties of this extraordinary metal, and in hopes that by rendering the method of fusion better known, I may induce others to pursue the object so far, as to be the means of discovering methods of making it malleable. It was the appearance of success in Mr. Nowell's two first experiments that engaged me to try the following processes, and I hope they are described so plainly, that any gentleman may readily and easily perform the same, who has been accustomed to the common operation of fusions.

I am



I am almost a stranger to what has *really* been done on the continent, having heard so many contradictory accounts; and I have not availed myself of any thing that has hitherto been performed. The experiments were conducted, exactly, as they are described, and several gentlemen of veracity and experience in chemistry were generally present. The great price platina bears in London has prevented me from making many more operations, but it is hoped these will be received with candour.

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EXPERIMENTS *on the Fusion of* PLATINA.

EXPERIMENT I.

Mr. Nowell having mixed one ounce of platina with a flux of nitre, sand and borax, after three hours exposure to a considerable degree of fire in a wind furnace, signs of fusion were perceived in the mass in general, and several globules, larger than I had ever seen before, appeared in different parts of the vitreous flux; of these, the largest were nearer the middle and top of the mass, and there was much less appearance of fusion at bottom.

EXPERIMENT II.

On seeing the above product, it occurred to me, that if a bed of charcoal powder was put into the crucible to the height of one fourth part, and the charge of platina, &c. put on it, it

would be exposed to a greater heat. I therefore desired Mr. Nowell to mix one ounce of platina with half an ounce of nitre, and half an ounce of glass of phosphorus, to put the mixture on a bed of charcoal in the crucible, and to keep it three hours in the fire, which he did, and produced one mass completely fused, that weighed about one drachm, besides several smaller masses.

### EXPERIMENT III.

As I had made several unsuccessful attempts to melt platina by itself, I was resolved to try if it could be done by mixing one ounce of borax without any charcoal at bottom; but after three hours I found only a cohesion, not a perfect fusion: there were only small globules near the upper surface of the mass.

### EXPERIMENT IV.

I bruised the cohering mass of the last experiment, and mixed one drachm of alkali of tartar, two drachms of borax powder, and one drachm of charcoal powder with it, put it on a bed of charcoal powder, and continued it three hours in the fire, and thus produced a perfect fusion of the whole platina; half a drachm only of the original ounce being wanting. The specific gravity of this was taken and proved to be 15.353. It was sent to different polishers and lapidaries, but was so hard, that it spoiled their tools:

tools: it is not highly polished, and is much paler than steel, but not so white as silver.

#### EXPERIMENT V.

I mixed one ounce of platina in grains with one drachm of alkali of tartar, two drachms of borax powder, and one drachm of charcoal powder, and put the mixture on a bed of charcoal dust in the crucible; and as I had observed something of an incipient fusion when the crucible had been in the fire rather more than half an hour, I exposed it one hour and a half, and obtained a perfect fusion. The fused mass was in two parts. The deficiency of weight of platina thus fused was half a drachm. I did not preserve the whole of the charcoal, but obtained from what was saved near twenty grains of unfused platina, which I supposed were dispersed too far from the power of the fire to be melted. The specific gravity of this parcel of fused platina was 16.8.

#### EXPERIMENT VI.

I wrapped up one ounce of platina in a piece of white paper to prevent any dispersion of its particles, and placed it on a bed of charcoal, covering also the paper with charcoal powder, and in two hours obtained a perfect fusion, with the loss of only a few grains of the metal. The specific gravity of this melted platina was 15.704. The difference of specific gravity

H h 4

between

between the platina in this and the former experiment, might probably arise from cavities in the latter, as I have since frequently found several cavities in parcels I have melted. The mass in experiment fourth was not broken.

The surfaces of those fusions made with fluxes are brighter than those melted *per se*, and for obvious reasons, viz. because the metal in the latter case has a more uneven pressure on its surface.

#### EXPERIMENT VII.

Two ounces of platina were melted according to the last process in two hours, with very little loss of weight. Dr. Pearson was present at this operation, and indeed in most of these experiments some person was present with me.

Dr. Pearson observes, "I saw Mr. Willis fuse  
 " two ounces of platina, which he said he procured from Mr. Woulfe, who had purified it  
 " by boiling it in the marine acid. The mode  
 " of fusion was by placing the platina, wrapped  
 " in paper, in the middle of a crucible, of about  
 " three inches wide, on a bed of charcoal powder.  
 " The charcoal was ground in a coffee-mill,  
 " the heat was as intense as could be given in  
 " his furnace.

"I put," says Dr. Pearson, "five hundred  
 " grains of platina, which had not been purified,  
 " into the middle of finely powdered and sifted  
 " charcoal, in a crucible of about four inches  
 " wide,

“ wide, therefore at least one inch wider than in  
“ Mr. Willis’s experiment, and gave it as great  
“ a heat as I could well produce for near  
“ two hours in my melting furnace : at the end  
“ of which time I found the platina only agglu-  
“ tinated. The fire in this experiment appeared  
“ to have been according to Mr. Wedgwood’s  
“ clay-pieces in several parts of the crucible from  
“  $165^{\circ}$  to  $175^{\circ}$  of his pyrometer. The specific  
“ gravity, taken by Mr. Moore in the presence  
“ of Mr. Willis, Mr. Henry, junior, and myself,  
“ was 15.42.”

#### EXPERIMENT VIII.

Mr. Henry, junior, a young chemist of great promise, brought to me a piece of the coalesced mass, mentioned above in Dr. Pearson’s remarks, and I melted it *per se* upon a bed of charcoal in two hours, in a degree of heat of 140 to 150 of Mr. Wedgwood’s pyrometer, but in a smaller crucible than the doctor used. Dr. Pearson took this fused piece and exposed it to the heat of a forge upon a thick plate of hammered iron, and in a white heat it became evidently in a beginning state of fusion, in which state upon the hot anvil it was flattened by the hammer, but cracked like cast iron.

The doctor sent the other moiety of the five hundred grains that were agglutinated, mentioned under experiment seventh, and desired me to try

to fuse it in the same sized crucible he had used, but the operation failed. It was tried a second time, on account of the last operation being shortened a quarter of an hour, but with no better success. On the third trial it was put in a smaller crucible, and still the operation failed. There was a strong agglutination, but not a perfect fusion. The conjecture of the cause of this failure will be mentioned hereafter.

Mr. Henry, junior, was present at all the operations mentioned under experiment eighth, and Wedgwood's pyrometer pieces were put into each crucible to ascertain the degrees of heat.

In this and all the experiments before-mentioned the fire was not remarkably strong, but in feeding it with coak, care was taken that it never burnt so low as to fall much below the upper part of the inverted crucible, and no fuel was added, which had not been previously heated on the iron plate which covered the furnace.

The pyrometer piece indicated  $160^{\circ}$  in the last operation that miscarried, and in the other two the fire was at least  $140^{\circ}$  to  $150^{\circ}$ .

#### EXPERIMENT IX.

One ounce of platina was placed on a bed of pulverised Welch coal, in the same manner as in the former experiments with charcoal, and an uniform fusion was in one hour and a half effected. It must be observed, that in all these operations the

the time of the continuance of the crucible in the fire was computed from the time it began to be red-hot until the last charge of cauk.

By several experiments made since the above, I have found that platina is capable of beginning to melt so as to form a smooth surface in  $136^{\circ}$  and to be in perfect fusion at  $150^{\circ}$ .

I tried the malleability of the mass fused in experiment fifth, and with a moderate blow with the hammer very little impression was made, but with a few heavier strokes, it broke into two pieces. The grain was close and resembled that of fractured steel, but somewhat duller. I treated in the same manner the mass melted *per se* in experiment sixth, and with the same effect, and the grain was perfectly similar. On filing this latter piece, it was found very hard, and exhibited a splendour nearly as bright as silver,

#### EXPERIMENT X.

Mr. Nowell, who was present at many of the operations, desired me to try whether platina would not melt on a bed of powdered clay or bone ashes. I filled a crucible about one fourth part with calcined bone ashes in powder, and put one ounce of platina wrapped up in paper on it, and exposed it for two hours to the greatest heat I could produce; but the platina was not melted, only a cohesion had taken place. Part of the bone ashes near the platina at the top, was

was converted into a white enamel, but in the lower part of the crucible, the bone ashes were only a spongy mass.

## EXPERIMENT XI.

I dissolved half an ounce of platina in twenty-four ounces of aqua regia and obtained a solution by digestion in heat. A precipitate was made by a saturated solution of sal ammoniac, which precipitate, when dried, weighed half an ounce. This was put on a bed of charcoal in a crucible, and in half an hour's time, it was cracked, and all the precipitate was lost in the fire.

## EXPERIMENT XII.

One ounce of platina was *bruised*, and dissolved more readily than in the former experiment in twenty-eight ounces of aqua regia. This solution was precipitated with a solution of sal ammoniac, and after drying the precipitate I took one fourth part of it and added half a pint of water, and stirred them well with a stick, and then saturated it with dry volatile alkali. The liquor was filtrated from it, and the powder, being dried, was put on a bed of charcoal powder, and exposed for two hours to the fire as in the former experiments. I obtained only thirty-one grains of fused platina: fifteen of which were in five larger globules, the remainder in very small ones.

EXPERI-



EXPERIMENT XIII.

The other three parts of the precipitate prepared in the last experiment, were treated in the same manner with dry volatile alkali, and I endeavoured to melt it upon a bed of charcoal, but could only obtain small globules after the application of an intense heat for two hours. These globules were powdered and mixed with one drachm of borax, one drachm of alkali of tartar, and one drachm of charcoal: a very small quantity of charcoal powder was at the bottom of the crucible, and in two hours I obtained a complete fusion. There was one large button, which weighed one hundred and sixty grains, and several small globules, some of which were so intermixed with the vitreous flux that they could not be weighed. The specific gravity of this was 23.4, it was very close grained and had no cavity, but was not malleable.

EXPERIMENT XIV.

As I had melted the platina in the last experiment with a flux and only a *little charcoal* at the bottom of the crucible, I tried to melt it without any flux, but with only a small quantity of charcoal. The platina was wrapped in paper and *just covered with charcoal*, and (as in all the former experiments) an inverted crucible served instead of a cover. In two hours time I obtained  
a complete

a complete fusion. I repeated this experiment two or three times, and always fused the platina, so that I think it extremely probable, that in the three operations I made to fuse Dr. Pearson's platina and failed, there was too much charcoal added at the bottom of the crucible.

I have also observed in one of my experiments for fusing platina by itself, that it continued in a fluid state for more than five minutes after the crucible was taken from the fire, for on breaking the crucible, it was perfectly fluid and ran like melted lead on the floor of the laboratory.

I tried to melt another parcel of platina in grains sent to me by Dr. Pearson, but the crucible falling from the stand after it had been in the fire half an hour, there was only an adhesion. This adhesive mass was bruised and treated as in the last experiment, and it melted in two hours. Its specific gravity was 14.65, but there were several cavities found in it when broken, and it was the whitest of any of my specimens.

#### EXPERIMENT XV.

As all the experiments made by me were done in one furnace, and the degrees of fire employed very little above 160° of Wedgwood's pyrometer, I tried to melt some platina *per se* in another furnace, which produced a considerably greater degree of heat. In my first experiment

ment in one hour and a half the crucible was melted flat, and the platina lost in the clinkers and ashes, which were thrown away.

I made another experiment, and though I did not keep the fire so strong, yet the upper crucible was partly melted, and by its pressure cracked the bottom one, and the contents were again discharged among the ashes and clinkers: these next day were carefully examined, and where any small globules of platina could be traced among the clinkers, those were saved as well as the ashes, and were very easily melted into a slag. A button of platina was found at the bottom of the crucible, which weighed near three parts of the whole weight that was put in, but it was of a dull colour.—Finding that inverted crucibles, in an intense fire, were improper, I have ever since used flat covers to them.

#### EXPERIMENT XVI.

Hearing, very lately, that in France platina had been melted easily with glass of phosphorus first, and afterwards by itself, and that it was rendered malleable by this process, I put half an ounce of glass of phosphorus in powder, to one ounce of platina, and after two hours exposure to a strong heat there was only a strong adhesion, not a complete fusion. The mass was bruised and put into a crucible with very little charcoal at bottom, and in two hours there

there was a perfect fusion. It was not malleable, and when broken, was coarse grained and had no apparent cavity. The specific gravity was only 12.3.

#### EXPERIMENT XVII.

One ounce of platina was mixed with only two drachms of glass phosphorus, but after two hours of very strong heat, there was only an agglutination. The mass was afterwards bruised and put into a crucible, with a little charcoal at bottom, and a complete fusion was effected in two hours. This was not more malleable than the last, and on breaking it, it was finer grained than that in the last experiment, but the specific gravity was only 13.89; although there were no cavities discovered.

There were five different sorts of platina in grains used in these experiments, one of Mr. Nowell's, two sorts of Dr. Pearson's, and two of my own.

#### EXPERIMENT XVIII.

As the platina used after the fourteenth experiment was different from that of my own used before, and the fifteenth not being successful, I repeated the latter with the same platina as used in those experiments, and in two hours fused it. It had a smooth surface, and when broken had no cavities; the specific gravity

gravity was 16.13. This was melted in the furnace which drew the strongest, as were all the experiments from the fourteenth. The fuel was placed only a little above the cover of the crucible, and a vacancy between the draught-hole being left, the fire was prevented from being too intense.

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PROPOSITIONS *respecting the FOUNDATION of CIVIL*  
GOVERNMENT; *by* THOMAS COOPER, *Esq.*

READ \* MARCH 7, 1787.

I HAVE often thought that the natural rights of mankind and the equitable principles of civil government, might be stated somewhat more briefly than I have any where seen them. With this view I have drawn up the following paper, containing the substance of many important discussions concerning the great outlines of civil liberty. It is of great consequence in my opinion, that a subject in which every member of society is so immediately interested, should be treated if possible so plainly as to be generally understood, and so briefly as to be

\* The Paper on Physiognomy, by Thomas Cooper, Esq. already inserted (page 408), was read at the Society, October 15, 1783.

easily remembered. I cannot say, however, that I have accomplished my own ideas in these respects; but where I have failed, I hope some other will succeed. At any rate, different modes of stating the same points cannot but have their use, especially on a subject so important, and of such direct and extensive application.

PROP. I. The right of exercising political power is either derived entirely from the consent of the people over whom it is exercised, or it is not. If not, from whence is it derived?

Ten answers may in effect be given to this question: of which the most part have already been proposed and defended respectively by writers expressly on the subject.

1. *It has been said to be of divine appointment—<sup>a</sup> derived from God.*

But which particular government is of divine appointment? \* What particular form of government did he appoint? To what man, or set of men, did he concede this political authority? What were the terms of the grant? Was it to him or them only to whom it was originally granted, or to their posterity also? Over how many men, or how many nations was this domi-

\* I have sometimes stated the medium of proof directly, and sometimes in the form of a question, as it occurred. The latter mode is often shorter and more familiar.

nion

nion to be exercised? What evidence have we of the existence of the grant at all? Do any of the present rulers throughout the universe derive their right from this source, mediately or immediately? May it not be said of every usurper, as well as of the most legitimate monarch, "the powers that be are ordained of God?" All these questions may be put, and ought to be resolved before this answer can be admitted, but I have not hitherto met with a solution of any of them. And it is to be observed, that no claim of this kind can be admitted which is not clear, precise, and incontrovertible. Nor does the burden of proof lie upon the people. If a fellow-creature informs me, that I and my posterity are bound to obey his commands, it is not for me to prove that I am not so bound, but for him to prove that I am.

*2. From patriarchal authority and successive delegation from the patriarchs.*

This is the exploded hypothesis of Sir R. Filmer; but granting for a moment, what can never be established, the right of the patriarchs to govern during the period of their existence, who can prove a right in them to transmit their power to others who come not under the same venerable description, or the uninterrupted descent, or succession, of those who would now arrogate the transmission?

3. *From parental authority : the head of a family who first settled in any country having the right of governing his descendants.*

This is somewhat similar to the preceding source of political dominion : at any rate, however, it can only extend over the progeny of the *living* parent ; a delegation to the eldest brother for instance, or to any other person, not being of this description. But granting for a moment this right of delegation in the head of a family, to how many successive generations does it extend ? Or how can it apply to the present circumstances of political affairs in any nation whatever ? Moreover, as the chief if not the only good reasons that can be assigned for submission in such a case to parental authority, is, the greater experience of age, and the greater incitement from parental affection to act with a sole view to the good of the family, this authority must cease with the life of the parent, because the reasons themselves for the submission will then cease : for without the gift of supernatural foresight no man can tell what new cases will arise in the succeeding generation, or what kind of a governor his immediate successor will prove : and every generation weakens almost to annihilation the mere tie of parental affection. But farther, on what ground can a parent, even during life, claim the absolute direction of conduct



duct over a son of forty years of age for instance? Suppose the son should think the patent wrong and himself right, ought he to act according to the dictates of his own conscience, or according to the commands of a father possibly of less understanding, and of decayed faculties? In fact it is now universally agreed that there are cases and times when parental authority ceases to become absolute, and changes into advice.

4. *The acquiescence of a parent under any existing government binds the family.*

(a) This does not relate to the *origin and foundation* of civil government, for there could be no such acquiescence before the government in question existed. (b) The parent cannot bind the son to perpetual submission even to parental authority, and much less to the authority of others. (c) If this source of authority were well founded, then would the acquiescence of a parent under tyranny and despotism, bind the son to obey likewise. (d) It is always allowed that no parent can deprive his son of his *personal* rights; he may limit what belongs to himself, the property he means to transmit, as he pleases; but he has no right to what belongs to the son. (e) This source would preclude all additions to, or diminutions of, the governing power, in any way whatever after the death of the father; for to such, the parental acquiescence could not

apply, and the then government would no longer be binding. (f) All the objections to the last answer (the third) apply in substance to this. (g) This answer, like the rest, is a *gratis dictum*; an unproved assertion.

5. *The personal acquiescence of the governed, under the government existing.*

If such an acquiescence be the result of force, and inability to resist, it amounts to nothing, and is no real acquiescence. If it be voluntary, it amounts to an implied assent, and then the persons governed are so governed with their own consent. As applied to the *origin* of government, this source of authority thus expressed cannot be admitted; for none then existed.

6. *It may be said that men are BORN subjects of some particular state, and that in consequence of this, they owe perpetual allegiance to the government thereof.*

This has been, and still is said, but it has never been proved. (b) It applies not to the *origin* of government, and before the particular state in question was constituted: and it may here be observed once for all, that as none of the nations upon earth has existed as a political community from all eternity, every such political community must have had an origin, or beginning of some kind; and if the political  
dominion

dominion was improperly obtained by the governors originally, the forcible continuance of it by their successors, cannot make *their* authority equitable. Long continuance cannot alter the nature of iniquity and convert it into justice. (c) This source of dominion would sanctify the grossest tyranny and despotism. (d) It may well be denied that there is any thing in the mere circumstance of being born in this or that part of the globe, that can equitably subject any one to the perpetual government of any other of his fellow-creatures: and if it be placed upon the circumstance of the parents being subjects, the preceding objections to *parental acquiescence*, apply. (e) This answer converts human beings into a species of property. (f) It is contrary to the maxim, that allegiance and protection are reciprocal, for a man may renounce protection. (g) It makes the people born for the government, instead of the government being created for the people.

7. *Is it not derived from prescription, from long continuance?*

No: for it could not have been of long continuance when it was first exercised; and if it could, prescription gives no right but in the positive institutes of municipal law; even there, *series annorum non consecrat errorem*.

8. *Does not actual power, the possession of force give right?*

No : for if so, then is any man justified in despoiling another, provided the first be the stronger. Moreover if might give right, then ought every parent of sixty or seventy to be in absolute subjection to his more powerful son of thirty.

9. *From conquest.*

With respect to the original derivation of civil authority this claim is nugatory : conquest must necessarily have been posterior to communities, or conquest itself could not have been.

Conquest, however, is in all cases pursued either (*a*) for the mere purposes of ambition and increase of territory : or (*b*) in pursuit of a war in some other way unjustly commenced on the part of the conquerors : or (*c*) to compel restitution for a national injury committed : or (*d*) to prevent any farther attempt of the same kind where there is good ground to suspect such an intention.

In the cases (*a*) and (*b*) conquest can never support the claim in question ; for an act of injustice can never be the foundation of an equitable right.

In the case (*c*) if the vanquished nation make restitution, no farther claim lies against them, and it seldom if ever happens that restitution  
cannot

cannot be made. If not, then it may be granted that the conquering nation may dispose of, or detain such part of the territorial possessions of the vanquished as are sufficient to satisfy the damage sustained. But when *personal* resistance has ceased, no claim can exist against the *persons* of the vanquished, and *à fortiori* none against their children and descendants. This case, therefore, furnishes no ground for the right to political authority and permanent dominion. With respect to the territory detained, the original inhabitants who choose to remain, or others who accept or purchase portions thereof, do so upon certain terms, so that the power over them must be derived from compact, *i. e.* their own consent. These observations will apply also to the case (*d*).

10. *But do not superior abilities, or superior attainments confer the right of ruling?*

No : for (*a*) there is just the same reason for a person's interference in my private business, because he pretends to know more of it than I do, as there is for his interference in my public business on the same pretence. (*b*) Moreover, has the community or the individual the right of deciding who possesses such? Surely not the latter, or the claims would be infinite; and if the former, then for whatever reason the authority is conferred, it is derived from the consent of the community.

community. (c) Public transactions do not require more than ordinary talents. A man of common understanding with the requisite application to the necessary studies, is as equal to the public as to the private departments of life. (d) This scheme would introduce all the evils of competition. (e) Connections and riches would perpetually interfere, so as to render the choice impracticable on the sole ground of ability. (f) In a large community it would be impossible to determine who had the best title on this score.

Beside these I think no other sources of political authority can be pointed out; and as none of these appear to furnish sufficient ground for the claim, but are all subject to insuperable objections, I conclude, that *the right of exercising political power, whether about to commence or actually existing, is derived solely from the people*. Of course, wherever such power is exercised, unless by virtue of a compact express, or upon sufficient ground implied, such exertion is TYRANNY.

II. But the people (*i. e.* a multitude of individuals) can have no right to exercise power, authority, or dominion over a fellow-creature, in their collective capacity, except in those cases where they had such a right in their capacity of individuals. The *people* is a term, expressing an aggregate of individuals; and the rights of the people (previous to compact) are no other than the aggregate of the rights belonging in common to

to the individuals who compose the people. If any other rights be ascribed to *the people*, whence are they derived? Excepting therefore such cases as these, viz. the right of parental dominion until manhood; the right of bodily coercion to prevent an injury being offered; the right of repelling an injury attempted; and the right of compelling restitution for an injury committed, it will follow from this and the first proposition, that no power, authority, or dominion can justly be exercised over any individual which has not been precedently derived from his own consent. Cases of infancy, idiocy, lunacy, coverture, and others similar, are evidently included in the preceding exception: such persons also being either naturally or by compact, *sui incompetēs*, incapable of self-direction. With respect however to unmarried women at years of discretion, the common practice of nations appears to be inequitable, and perhaps indeed to the married.

III. The authority of the governors, is derived from the consent of the governed. But no man can reasonably be presumed, voluntarily to have delegated to another any dominion over himself, but for his own good; and in expectation of something in return at least equivalent to the concession. Nor can any man be supposed to prefer the state of civil society, but with a prospect of living more happily upon the whole by becoming a member of such a state, than otherwise.

wife. Hence, the happiness of the community (*i. e.* of the individuals who compose it) is the great end and object of civil society; and the regulations adopted, are or ought to be, no other than the means to that end.

IV. Farther, as no man can reasonably be presumed to have made a voluntary surrender of any right previously enjoyed, or to have submitted voluntarily to any subjection, but in expectation that in the sum of happiness upon the whole he would be no loser by so doing; it follows, that no right can be presumed to be given up, or any dominion delegated, but what is absolutely necessary to attain the great object of civil society, *viz.* his own happiness in common with that of the other individuals who have done the same: otherwise we must suppose a voluntary concession of rights for the benefit of others, and a voluntary subjection to the will of others without an expected equivalent in return: which, except in the cases of family connections, or obligations conferred, or peculiar friendship, is absurd.

V. Also, wherever it can be made highly probable that from the nature of civil society, it cannot afford an equivalent for any particular right supposed to be surrendered, we may fairly conclude that such right never was or could have been surrendered. Thus the right of a man to the exclusive society of his wife, the  
right



right of a parent to educate his children in his own way, the right of following the dictates of conscience in matters of religion, the right of resisting a sudden attempt to deprive one of life, &c. are such as have no equivalent to my knowledge in any thing that society can bestow. It cannot therefore in equity be presumed that these rights are renounced on becoming a member of political society, nor can society be presumed to require the renunciation of that, which it cannot purchase by an equivalent.

VI. By Prop. III. & seq. wherever the power or dominion delegated is inconsistent with the object of civil society, for which alone it was delegated, the persons delegating must have a right of recalling or annulling partially or totally, as circumstances may require, that power which no longer answers the ends of its creation. *Cessante ratione cessat et ipsa lex*. Hence also, the propriety of frequent revisions of political constitutions. For experience alone can determine the kind and degree of power which is absolutely necessary and no more, to effect the purposes of civil society. With respect to which indeed our knowledge hitherto seems in its infancy.

VII. In case of any dispute respecting authority claimed, the burden of proof lies rigorously upon the claimants. For it is strictly incumbent on every man before he acts, to be certain that he is not about to do an act of injustice,  
more

more especially if the slightest intimation be given that this may be the consequence. Nor is it at all incumbent on those who are the objects of exerted authority to prove that no such authority equitably exists; for it is indisputable that no man is bound to prove a negative. Experience moreover shews the liability to abuse of entrusted authority, and the consequent propriety of insisting on this condition.

VIII. For the same reason, wherever the renunciation of a right on the part of the governed, is claimed by the governors as necessary to the ends of society, it is incumbent on the latter (more especially if required) to point out clearly the necessity alledged. Exerted authority, where the propriety demanded is not shewn, is the same as if it were improperly (*i. e.* tyrannically) exerted. *De non apparentibus et non existentibus eadem est ratio.*

IX. Nor can the renunciation of any right be demanded of one individual which may not be equally required of every other individual of the community, otherwise society will be benefitted at the expence of an act of injustice; for it ought to be presumed that every member of a community enters into it upon equal terms with the rest, there being no reason in the nature of the thing, why some should be supposed to join voluntarily in a society under peculiar disadvantages,

disadvantages, or to consent that exclusive privileges should belong to others.

X. Hence if from peculiar circumstances the good of the community require that some part of its members should give up certain of their rights, or be in any way restrained in the enjoyment of them, this can only be insisted on in the way of purchase; and a full equivalent is due to those who thus contribute to the good of the community out of the common proportion of the rest of its members. Of course, where society has no equivalent to bestow in return for the renunciation or restriction of any right on the part of such of its members from whom it is expected, this renunciation or restriction cannot be compelled without an act of injustice.

XI. Neither is it to be presumed that on entering into society we have surrendered the right of doing that, which, independent of society and antecedent thereto, it was our *duty* to perform. A debt from *A* to *B* can never be cancelled by any agreement between *A* and *C* wherein *B* is no way concerned. It is a duty (for instance) incumbent upon every man, whether he be or be not a member of society to worship God in that way which his judgment points out as the most proper; nor can any compact express or implied between him, and others of his fellow-creatures justify any breach whatever of his duty to his Creator.

XII. Moreover

XII. Moreover as the intent or end of society is the promotion of the happiness of the individuals who compose it, and as the benefits of society can extend to or be enjoyed during a *part* of our existence only—we may infer generally, that the means of promoting our happiness in society (*i. e.* the regulations we submit to therein) ought to coincide with the means we are to use for promoting our happiness upon the *whole* of our existence, and when political society with respect to us, shall be no more. Otherwise society, instead of adding to our happiness upon the whole, would decrease it, and the sole object of its institution would be defeated.

XIII. It is to be observed, however, that we are not permitted *to do evil that good may come*; for any enormity might be justified upon such a pretence. So that, if any person under an idea that he is performing a duty of superior obligation to those of society, does an injury to the person or the property of his neighbour, it will be perfectly consistent with the ends of society that such person be punished; not indeed under the notion of preventing his obedience to the dictates of his conscience, but upon the general ground of preventing and repressing injurious conduct. For without this the ends of society could never be accomplished, nor could society itself exist; while the punishment of the person injuring, on the other pretence, *viz. because*

cause we think his conscience is misinformed would be a gross act of injustice; and equally applicable against ourselves as against him. Moreover, the right of repelling an injury, would have belonged to the person injured on whatever pretence it were offered, had society never existed. This reasoning is agreeable to the common axioms of, *sic utere tuo ut alieno non ledas*. And, rights inconsistent with, or destructive of each other, cannot exist.

The six last propositions, are applicable to the subject of *religious liberty*.

XIV. Society is intended to promote the happiness of the individuals who compose it. Hence the interest (*i. e.* the happiness) of the majority, is to be preferred to that of the minority. Otherwise society would produce a decrease, and not an addition to the sum of temporal happiness. It is possible indeed, that promoting the interest of the minor part, might in some particular case produce a degree of happiness equal to ten, while promoting the interest of the major-part, in that particular case might produce a degree of happiness equal only to nine. In such a case the degree ten ought perhaps to be preferred. But as we are not in possession of a sufficient number of data, in the present state of human affairs, to ascertain such a point as this, it cannot practically be noticed. So that the general rule in this proposition holds true.

XV. Hence, excepting those rights which it would be inconsistent with the ends of society to renounce, or that are unnecessary to the ends of society, or connected with duties of prior or superior obligation to those of society—the interest of any one or any number of individuals constituting the minority only, must be presumed to be conceded where it interferes with the interest of the majority.

XVI. Hence also, for every practical purpose the majority is synonymous with the society.

XVII. The same reasons will hold with respect to all those cases where the opinions of the individuals who compose the society, are requisite concerning any proposed means of compassing the ends of society. For if the opinions of the few were in all cases to be deemed of equal weight with the opinions of the many, the object of society would be perpetually frustrated, nor could society itself long exist.

XVIII. Moreover, in all cases where the sentiments of the majority cannot be ascertained *numeratim* or individually, it must of necessity be presumed that an *active* majority is a true majority: for where every one may be active who chuses, the presumption is equal on both sides of the question concerning those who are apparently neuter. Hence, whenever an opportunity is given to all, publicly to signify their sentiments on any general questions, the majority of those

those who thus actually signify their sentiments, ought to be accounted the majority of the whole.

XIX. But as it is impossible even for the majority of a society, to act individually without such confusion as would defeat the end of the assembly, unless in very small communities, a few must of necessity be deputed to act for the many.

The propositions respecting majorities, will of course hold true concerning these (comparative) few.

XX. The few, thus deputed to act for the many, of course also, receive all their authority from their constituents, for there is no other source, consistent with the maxim already exhibited.

XXI. As this authority is conceded for some end or purpose, it must of course be limited in extent and duration by the end or purpose for which it was created : hence the persons deputing, must have a right remaining of extending or limiting, continuing or annulling the delegated authority, as the circumstances for which it was granted may from time to time require. Also, as the happiness of the community and not merely of the representatives or persons deputed, constitute the object of society, the majority of the community, *i. e.* of the persons deputing, must have the right of judging of these circumstances.

XXII. If therefore the persons deputed extend their authority in continuance or degree, either

beyond what the circumstances require for which it was delegated ; or beyond or without or against the inclinations of the majority of the persons deputed them, the rights of the latter are infringed and they are injured.

XXIII. But every man who does an injury to another, of whatever kind or to whatever extent, is accountable to the person injured, who may demand redress. Hence whenever the persons deputed exercise their authority inconsistently with the ends for which it was committed to them, they are accountable to the people who committed it. But as the people who committed it retain the right of judging whether it be properly exerted or not, the persons to whom it is committed are accountable to the people universally. That is, the governors of whatever description in every society upon earth are accountable to the governed.

XXIV. By Prop. I. and II. no person can justly exercise any power or dominion over another, but what is precedently derived from that other : nor indeed can any other definition in substance be given of slavery than, " that state " or condition in which a man is governed without\* his consent." Sometimes indeed the cases may be so few and the degree so slight, that it passes unnoticed. But that the essence of

\* Not, " against," for this may consist with freedom.



slavery is such as above described, will be evident to any one who will be at the pains of thinking on the subject. Hence if any member of a society is deprived of the means of assenting or dissenting, either by himself or his representative, to the regulations of that society to which he is at the same time obnoxious in quality of being a member thereof; or if through any circumstances which do not affect the individuals of the community in common as well as himself, or to which he hath not had an opportunity of previously assenting, his assent or dissent is rendered ineffectual, such person is clearly under a dominion and rule which is not ultimately derived from himself: his state with respect to those regulations and the executive officers of them, is a state of slavery, and the enforcement of those regulations with respect to him is tyranny. Nor is the nature of the thing changed because others are sufferers as well as himself, or because the tyranny is only exerted to a certain degree.

XXV. The case of a stranger, not permanently resident, is hardly an exception to the preceding proposition, for by the terms, such an one is not a member of the society in question, but of some other. And, in fact, his voluntary residence in or passage through the territory of any society but his own, amounts to an assent for the time to the regulations of that society which he thus voluntarily enters.

XXVI. It is a question, however, much more difficult to determine, whether the right of suffrage, should be in any degree regulated by the possession of *property*, or be considered as a right simply attached to the *person*. For my own part, after much consideration, I incline to think that a line of exclusion *may* be drawn, and that no injustice is done by debarring those from voting in the choice of national representatives, who on account of their poverty, are exempted from the payment of all taxes. For, first, no person can demand to interfere in framing laws, who contributes nothing to the expence of enacting or enforcing them. Secondly, Nor can any one demand this, who possesses no ostensible pledge that he will submit to the execution of them. Thirdly, By far the greatest part of laws relate to objects in which such a person has no interest. For instance, it is absurd to give a right of legislating concerning the property of others, to those who have none of their own; and who risk nothing on the event of their own regulations. Fourthly, A certain quantity of territory is essentially necessary to the existence of a political community; and it is optional to the possessors thereof, to admit or reject as members of the community upon their own terms, those who have no proprietary or usufructuary right to any part of such territory; provided also it be left optional to the latter, to accept or reject a  
membership

membership on the terms proposed. Fifthly, As so large a portion of the laws of every community consist of regulations concerning property, the right of suffrage ought to be considered as connected with both the objects of law, viz. persons and property. Even if two separate legislatures were provided, one for a *civil*, and the other for a *criminal code*, yet would the preceding objections hold with respect to the latter. Sixthly, The exclusion on the ground above-mentioned, would extend to so small a portion of the society, that where the representation is adequate there would be little chance but the regulations adopted would accord with the inclinations of a majority of the *whole* community.

To the preceding reasons may be added, the difficulty of ascertaining who had or had not voted before for any particular district, if mere personality gave this right—the probable suspicion of want of knowledge and independence in this class of people—the consideration that those who enjoyed the right in question, would be equally interested with the persons excluded, as to those laws in which alone the latter could claim an interest—the stimulus to exertion, which the exclusion itself would furnish—and the superior facility with which the suffrages of a community could be collected, if confined to

householders paying (as the term is in England) scot and lot.

Notwithstanding however I incline upon the whole to the propriety of such an exclusion as here proposed, I still think the subject requires more discussion than has yet been given it; and that to make the exclusion itself equitable, no punishment ought to be enjoined involving the class excluded, which every other individual would not be equally subject to, for the same crime: and also that no regulations ought to be made respecting the individuals of the class thus excluded, and those of any other, which in their operation would not be equally beneficial to both; and lastly, that free egress out of the community should be allowed to all those who are disinclined to stay in it; in which case perhaps an implied consent may fairly be presumed on the part of those who voluntarily remain.

XXVII. This last condition is indeed contrary to a maxim (I believe) universal among municipal lawyers, viz. that "the natural born subject of a state is under an obligation to perpetual allegiance"—a maxim (already noticed in Prop. I. and) beyond all doubt absurd and tyrannical—absurd in as much as all civil society is founded on compact, and no compact can be valid unless between parties able and willing to contract; but the mere fortuitous circumstance of being born here or there in this  
state

state or that, is not under the controul of the native at the time, nor is ability or willingness then predicable concerning him; nor can any right be shewn in a parent to make an indefeasible contract on the part of his child, to be performed when the latter is no longer under the controul of the former: tyrannical this maxim is, because whatever may be the government, however despotic in principles or practice, it arrogates perpetual indefeasible dominion, underived from the consent, express or implied, of the person governed. This particular question however I shall treat expressly much more at large, at some future opportunity.

XXVIII. The preceding propositions have been deduced abstractedly from the consideration of any particular society, and appear to hold universally true concerning society itself; and therefore where a civil society is already formed, these propositions ought to be considered as the terms and foundations of the implied compact among the members; the opposite propositions being inequitable. Hence whether a man is about to enter for the first time as a member of any political community; or whether (fortuitously with respect to himself) he finds himself already a member of such a community, his rights are still the same, and all dominion over him must ultimately be derived from his own consent expressly given or equitably implied.

XXIX. Where-

XXIX. Wherever therefore any political government is not constituted and exercised in conformity to this grand maxim, "that all power is derived from the people," and the evident consequences deducible from that maxim—the governed are injured; and deprived of rights, which may be proved to belong to them. So that the people in every nation upon earth, may justly demand that the government under which they live, be altered in conformity to that maxim, wherever it is not so already.

XXX. But it is universally allowed, that wherever a right exists, there exists also concomitantly, a right to the means of obtaining it; else the right itself is nugatory. So that if any right belonging to the people, should be forcibly infringed, or withholden from them by the governors of any community, after repeated applications for redress in a peaceable way, the former have a right forcibly to obtain it.

XXXI. Also from Prop. VI. and XXI. it may be deduced universally that whenever any alteration in the form of government, or change in the officers of government appears eligible to the majority of the people, they have a right to insist on such alteration or change, whether the officers before appointed were temporary or hereditary. For, whether the office itself, or the officers, answer the purpose of their appointment, must be decided either by the  
governors

governors or the governed. This right of determination ought not to belong to the former, because they not only may, but generally have an interest opposite to the welfare of the whole community—the honours, the power and the emoluments annexed to offices of government, being universally desirable, the possessors will be perpetually induced to support their own continuance in the enjoyment of them, whether necessary or otherwise to the ends of society. The people however *can* have no interest but that of the community at large (*i. e.* of themselves) and of course can have no other object in determining, but the object itself for which society was formed.

The will of the people therefore (*i. e.* of the majority) ascertained as correctly as the nature of the case will admit is of itself a sufficient reason for any change whatever, in the constitution of a kingdom or the officers of government.

XXXII. As the people have this right, they have also a right to the means of enabling them to exercise it: otherwise (as I have observed before) the right itself is nugatory; a mere name. Hence if after every peaceable method of obtaining any political change, has been repeatedly used in vain on the part of the people, the latter will be justified in rising to *compel* an obedience to their commands.

XXXIII. But

XXXIII. But as it cannot be supposed that the majority of the people will rise at one and the same instant of time, there must be some rise before others. So that if the common and peaceable methods to obtain a compliance with the requisitions of the people, have been unsuccessfully repeated, any number of men however small are justified in making a beginning, where a beginning must necessarily be made: nor can any general reasonings, nor do any historical facts warrant the opinion that such changes or alterations will ever be attempted on light ground: that burden must be heavy indeed which a whole people unite to shake off.

XXXIV. But as every member of society ought to aim at the welfare of the community, and of course should endeavour to produce the greatest balance of good upon the whole; in case any alteration although desirable to the majority of the nation, if attempted by force, is likely to produce a considerable degree of resistance from the officers in power, the good to be obtained by the alteration ought to be compared with the evils likely to ensue from the enforcement of it; and if the latter, *obviously* preponderate, no man can be justified in attempting such alteration by force at *that opportunity*.

In all cases however it is to be considered in the comparison, that the evils, will most probably afflict the present generation only: the good, will  
most



most probably endure to posterity for an indefinite length of time. Thus England enjoys the benefit of the exertions of the people under the tyrants John, Charles, and James even at this day: the evils of those exertions were confined to a generation or two.

Such are the *principal* deductions, from that grand maxim, the very corner stone of legitimate government, that *all power is derived from the people*. Deductions, which the rulers of the earth have seldom inclined to admit, as they tend to the abolition of usurped authority. But those only will inveigh against promulgating the civil rights of mankind, who either mean to infringe those rights, or have some interest or other in defending those who do. Sedition against the officers of government, is a fruitful source of criminal jurisdiction; while sedition against the majesty of the people, is a crime unknown to the penal code, and universally practised with impunity and in cases out of number arrogated as a right, by the servants of the people in every nation upon earth.

The structure of political oppression however, begins now to totter: its day is far spent: the extension of knowledge has undermined its foundations, and I hope the day is not far distant when in Europe at least, one stone of the fabric will not be left upon another.

OBSERVATIONS on the ART of PAINTING ; *among*  
*the* ANCIENTS ; by THOMAS COOPER, Esq.

READ DECEMBER 21, 1785.

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P A R T . I.

**M**R. KERSHAW, in his ingenious paper on the comparative Merit of the Ancients and Moderns with respect to the imitative Arts, is of opinion that the ancients were inferior to the moderns in point of colouring, because the former *having only four colours*, black, white, red, and yellow, could not possibly from these produce the variety of tints necessary even to a moderate colourist.

This opinion of the paucity of colours in use among the ancient painters, though a common one, and countenanced by authors of repute on the subject of painting,\* is certainly  
 erroneous

\* Thus De Piles says, Pliny writes that " the masters of the art of painting in his time made use of but four capital colours, out of which they produced all others." Art of Painting. Life of Protogenes. In fact Pliny says no such thing, but directly the contrary, as will be seen hereafter.

" Another

erroneous when adopted without restriction; I shall therefore take the liberty of offering to the society some observations on this subject, as well as on the general state of painting among the ancients.

The greatest part of this essay would be totally needless and many a quotation saved, could the remains of ancient paintings which Italy possesses, be transported hither for our ocular inspection: but as that cannot be the case, we must be content to rely upon the testimony of others, under circumstances where we cannot decide upon our own, and much of the following essay must therefore unavoidably consist of quotations from ancient authors.\* The elegant  
selection

“ Another circumstance that tends to prejudice me in favour of their colouring, is, that some of their (*i. e.* the ancients) principal painters used but four colours only. “ I am convinced the fewer the colours, the cleaner will be the effect of those colours, and that four is sufficient to make every combination required.” Sir Joshua Reynolds. Notes to Mason’s *Fresnoy*, p. 94.

\* Some few of the following quotations I have taken at second hand; and in this case I have quoted conjointly the modern author to whom I am indebted. I have been the less sparing in quotations and references, because had my time permitted me to fulfil my intentions I meant this essay to consist chiefly of what has never yet been attempted in any moderate compass, or in any tolerable degree executed, viz. a common place of passages relating to the various departments of ancient painting. The dull mass  
of

selection however from the antique paintings discovered at Herculaneum, contained in the "Voyage Pittoresque de Sicile," many of which Mr. L. Philips has accurately copied for the inspection of the society, will contribute in some measure to supply the want of the valuable originals, and elucidate the topics of this paper, excepting in the circumstance of colouring.

I propose in the following pages to consider *briefly*, 1. Whether the ancients had at any time more than *four colours*, and at what period more were in use.

2. Whether they were deficient in DESIGN, EXPRESSION, COLOURING, COMPOSITION, (including *harmony of colouring, chiaro-scuro, and grouping*) INVENTION, COUTUME, OF PERSPECTIVE.\*

of literary lumber which Junius has heaped together in his *prolix folio*, contains many apposite quotations, but *rari nantes in gurgite vasto*. The papers in the Memoirs of the Academy of Inscriptions are far superior; combining (in general) learning with taste; but they are in a voluminous and scarce work; too long; imperfect; and too partial to the ancients. Such other dissertations of merit as I have met with comparing ancient and modern painting (those of Dolce, Du Bos, Webb, &c.) are too cursory and incomplete to answer the purpose of a summary of knowledge on this subject.

\* The three first, may be applied to paintings containing only a single figure: the three last to performances more complicated.

3. What

3. What we know of them as PORTRAIT, LANDSCAPE, COMIC and SATIRICAL painters.

4. What were the various modes of painting among the ancients with respect to the MECHANICAL parts of the art. And

5. What miscellaneous observations appear worth noting.

I apprehend, the notion that the ancients in general had no more than *four colours* in use, for painting, was deduced from a hasty perusal or misapprehension of the passages quoted in the notes from Aristotle,\* Cicero,† Pliny,‡

\* *περι ποσων, cap. 5. Ζωγραφία λευκων τε και μελαινων, &c. Pictura ex discordibus pigmentorum coloribus, atris, albis, luteis, et puniceis, confusione modicâ temperatis, imagines iis quos imitatur similes facit.*

† Similis in pictura ratio est, in quâ Zeuxim, et Polygotam, et Timantem, et eorum qui non sunt usi plus quatuor coloribus, formas et lineamenta laudamus: at in Ætione, Nicomacho, Protogene, et Apelle, jam perfecta sunt omnia. In Brut. num. 70.

‡ Quatuor coloribus solis immortalia illa opera fecere; ex albis Melino, ex filaceis Attico, ex rubris Sinopide Ponticâ, ex nigris Atramento, Apelles, Echion, Melanthius, Nicomachus, clarissimi pictores, cum Tabulæ eorum singulæ, oppidorum venirent opibus. Hist. Nat. lib. XXXV. 32. So also XXXV. 36. speaking of the paintings of Apelles, he says, Legentes meminerint omnia ea quatuor coloribus facta. These passages are contradictory to the implication respecting Apelles in the preceding quotation from Cicero.

Philostratus,\* and Quintilian.† But it will be evident from an attentive consideration of the passages themselves, and still more from the authorities I am about to adduce, that this opinion is true only with respect to the ancients *κατ' εἶδος*, to those who were stiled ancients in the days of Cicero and Pliny, and not with respect to persons so called in the writings or conversation of the moderns, by whom Cicero and Pliny themselves are properly ranked among the *ancients*.

It is somewhat singular also, that almost all these passages, either upon the face of them as quoted, or with the addition of the succeeding sentences, in the original, manifestly prove that the ancient painters, cotemporary with these authors, had a variety of colours in use. Thus in the passage from Cicero: "In their paintings, says he, "who used no more than four colours, "such as Zeuxis, Polygnotus, and Timantes, we "admire the outline and the features; but in "Ætion, Protogenes, Nicomachus and Apelles, "all is perfect," evidently including colouring,

\* *τὴν δὲ Ζωγραφίαν αὐτῶν*, &c. *Picturam enim non eam solum videris putare quæ coloribus absolvitur. Nempe unus etiam color veteribus illis pictoribus satis erat. Incrementa verò capiens ars quatuor adhiberit; inde plures etiam; at et linearum picturam, et quod coloribus destituitur, quod ex umbra et luce compositum est, picturam fas est appellare.* Philost. *Vit. Apoll. Tyan.* lib. II. cap. 22. Paintings in one colour only, were called *Monochromata*.

† *Clari pictores fuisse dicuntur Polygnotus atque Aglaophon, quorum simplex color sui studiosos adhuc habet.* The *simplex color* here, I think, does not mean merely *Monochromata*. Lib. XII. cap. 10. and

and implying that the latter set, used more than four colours.

The words immediately subsequent to the first of the passages quoted from Pliny are these; *Nunc et purpuris in parietes migrantibus, et India conferente fluminum suorum limum et draconum et elephantorum saniem, nulla nobilis pictura est. Omnia ergò meliora tunc fuere cum minor copia.*

So also Philostratus: "The ancients were  
" satisfied with one colour; but the increasing  
" progress of the art, afterward, employed four;  
" and from thence even more than that num-  
" ber."

Pliny in another place\* mentions that Cræteus, Dionysius and Metrodorus, Greek physicians, published paintings of plants and herbs, and wrote under them their properties: and elsewhere† he notices paintings of several kinds of birds. Neither of these could well be managed with white, black, red, and yellow only.‡

Philostratus|| has a treatise among his works, containing a description of several paintings which he saw in a collection at Naples. In the picture, among these, entitled *Ariadne*, Bacchus, he says, is clothed in purple, and his head is adorned with roses. In the *Amphion*, Mercury presents a cloak of the colours of the rainbow. In the *Pasiphaæ*, her whole dress is said to shine

\* Not to mention the grapes painted by Zeuxis: *puerum uvas petentem.* Plin. XXXV. 36.

† XXXV. 37.

‡ X. 5.

|| Icon.

with celestial splendour far excelling the colours of the rainbow. In the *Tyrrheni* the sea monster, raised by Bacchus, was of a sea-green colour. And in the *Hunters*, a most exquisite purple is mentioned as the colour of one of their cloaks.

“How much more splendid, says Cicero,\*  
“in brilliance and variety of colours, are the  
“paintings of modern days, than those of the  
“ancients! but however attractive at first view,  
“they are not so permanently pleasing.”

But not to multiply quotations from ancient authors concerning paintings that no longer remain, it will be sufficient to refer to the passages noticed below, † from modern descriptions of discovered antiques, which fully confirm the same point.

Indeed, no *certain* conclusion can be drawn that the more early among the great painters of the ancients, such as Apollodorus, Zeuxis, Timantes, &c. had no more colours to use than  
the

\* *Quanto colorum pulchritudine et varietate floridiora sunt in picturis novis pleraque quam in veteribus! quæ tamen etiam primo aspectu nos ceperunt, diutius non delectant. De Orat. 3.*

† Among the *Alcuni Osservazioni* at the end of the first and second volumes of the *Antiquities of Herculaneum*, published by order of the king of Naples, mention is made of painted peacocks and doves among the other reliques.

Montfaucon (*Suppl. à l'Antiq. p. 161.*) describes a beautiful painted ceiling in fresque, from which it appears  
not



the four already mentioned, merely because they did actually use no more. On the contrary, it may be conjectured with some degree of probability, from the anecdotes related by Apelles, from the general commendations given to the more early painters for their chasteness in design, and from the complaints Pliny\* makes of the gaudy taste of the Roman painters, that the Greeks in general were *designedly*† chaste in their colouring,

not only that the ancients were in possession of an azure or deep blue, but that they had the art of laying it on in *frêsquë*, so as to continue in great brilliancy (*en grande vivacité*) for many centuries, provided the walls were not liable to be affected by damp. In p. 177, of the same volume, he describes the habit of a painted gladiator, where a great deal of blue appears to have been used. In particular the concave part of the buckler *est d'un bleu foncé*.

In the collection of prints from the paintings in the sepulchre of the Nasonii in the Flaminian way, published by Bellorinus (Græv. tom. XII.) there are many blues and violets mentioned.

Turnbull has coloured some of the prints which he published from antique paintings, after the originals, and blues are to be seen there. See also Winkleman, *Hist. de l'art chez les Anciens*, vol. II. p. 99.

\* XXXV. 32.

† “ The paintings of the ancients,” says Dionysius Halicarnassensis, “ were simple and unvaried in their colouring, but correct in their drawing, and distinguished by their elegance. Those which succeeded, less correct in their drawing, were more finished, more varied in

. L 1 3

“ their

colouring, and not so merely from necessity, at least about the time of Zeuxis and Apelles: for the former could not have painted grapes so naturally as he is said to have done\* with the four colours only so often mentioned. Neither would it have been the practice of Apelles to have varnished his fresh paintings with brown varnish,† if he had not possessed a true taste in this part of painting, and purposely avoided the meretricious glare with which the Roman artists were afterwards captivated. Nor is it at all strange, that a judicious eye should reject, as much as possible, such cold unmellow tints as blues and greens. These observations are also confirmed by the rebuke given by Apelles‡ to one of his scholars, who having painted a Helen very gaudily, “young man,” says Apelles, “not being able to make her beautiful, you have made her rich.”

I think it highly probable therefore, that among the superior painters in the more early stages of the art, no more than four colours were employed, at least in portraits, and till the time

“their lights and shades, trusting their effect to the  
“multitude of their colours.” In *Iszo*, p. 167, edit.  
Oxon. Webb on Painting and Poetry, p. 83.

\* Plin. Hist. Nat. XXXV. 36. Senec. contr. lib. X.  
contr. 5.

† Plin. Hist. Nat. XXXV. 36.

‡ Clem. Alexand. Pædag. Lib. II. cap. 12. Plin. XXXV. 3.

of

of Alexander the Great, partly perhaps from design and a preference given to a warm tone; and partly because the other colours were not easy to be procured in a proper state of perfection\* till a later period of the art. From that æra a multiplicity of colours were gradually discovered and introduced, until the stock was augmented to the degree noticed by Pliny in his enumeration of the pigments employed in his time. †

That the ancients paid a particular attention to ~~colour~~ <sup>colour</sup> would be evident from the manner in which they speak of this department of the graphic art, even though the moderns were not in possession of such remaining proofs of their excellence herein (though by artists of an inferior class) as to place this point beyond the reach of doubt.

From the account given by Pliny of the origin and progress of painting † (an account *a priori* extremely probable) it appears that the first

\* It appears from a passage of Pliny, before quoted, that purple and blue were not discovered till late in the æra of painting. *Nunc et purpuris in parietes migrantibus et India conferente fluminum suorum lham (i. e. blue); &c.*

† Lib. XXXV. 12, et seq. Pliny XXXV. 40, says of Pamphilus the painter, *Amavit in Juventâ Glyceram municipem suam, in ventricem coronarum, curandoque imitatione ejus ad numerosissimam florum varietatem perduxit artem illam.*

† XXXV. Pass.

L 1 4

efforts.

efforts of painters were bestowed on the outline of the objects imitated. That this is the most important part of the art is evident, because this alone will produce a resemblance, and without this no resemblance can be procured by any other means. Indeed, the attempt to colour without a previous design would of itself form an outline. The story related concerning the visit of Apelles to Protogenes\* shows that even when the art had made a considerable progress, or rather had approached towards its acme among the ancients, the test of skill was in designing; nor do I recollect any performance of modern ages; that proves so exquisite a freedom of pencil.

Indeed, when it is considered that with respect to freedom and correctness of outline, painting and sculpture are very nearly connected, that Phidias and Apelles were nearly contemporaries, that many of the ancient painters such as Zeuxis Protogenes, Apelles, &c. were accustomed to modelling for the purpose of sculpture or of casting, † that the extreme elegance of design in the ancient statues is so notorious as to be the acknowledged model even for modern artists, and that these ornaments of sculpture were well

\* Pliny, XXXV. 36.

† Phidias also was somewhat of a painter, Plin. XXXV. 34. and XXXVI. 4.

known and universally admired among the ancients, we shall have little hesitation in admitting their equality with the moderns so far as *design* is concerned. But should any doubt remain on this point, the drawings from the antiquities of Herculaneum already mentioned, will be striking proofs, that truth, elegance and spirit, in a degree rarely to be met with among the moderns, were habitual even to the common run of artists in the declining age of ancient painting.\*

The ancients excelled, moreover, not merely, in the common and obvious parts of *design*, but they appear to have had no inconsiderable degree of skill in the art of *foreshortening*. The performance of Pausias is a proof of this. *Fecit autem grandes tabulas sicut spectatum in Pompeii Porticibus Baum immolationem. Eam enim picturam primus invenit quam postea imitati sunt multi, equavit nemo. Ante omnia, cum longitudinem Bovis ostendere vellet, adversum eum pinxit, non transversum, et abundè intelligitur amplitudo. Dein cum omnes quæ volunt eminentia videri, candicansq; faciant, coloremque condant, hic tatum bovem attri coloris facit; umbræque corpus ex ipso*

\* It is also no slight proof of skill in designing, that so many of the ancient painters, such as Pausias, Nicias, &c. undertook *large* pictures. The most extraordinary performance of this kind was the portrait which Nero caused to be taken of himself upon canvass (Linteo) whereon he was painted one hundred and twenty Roman feet in height. Plin. XXXV. 33.

*dedit;*

*dedit ; magnâ prorsus arte in æquo extantia ostendens et in confracto solida omnia.\** None but a good painter would have ventured to exhibit the animal thus facing the spectator, and still less would have hazarded the dark colour of the animal and of the ground, unless he had been somewhat acquainted with the principles and effect of light and shade. †

Toward the latter period of the art, it became fashionable to ornament the apartments of private houses as well as the walls of temples with fresco paintings. Most of the ancient paintings now remaining are of this kind; and the ceilings as well as the walls were decorated with paintings. In this purpose, it is well known, that considerable skill in the art of foreshortening is necessary, and as the custom was common, we may therefore very reasonably conclude, that the ancients attained to great excellence in this, as well as in the whole of design.

Nor will it be difficult to shew that the ancient painters were not inferior to the moderns, in **EXPRESSION**: the department of painting which most directly applies to the feelings of mankind

• Plin. XXXV. 40.

† Pliny, speaking of a picture of Jupiter among those of Apelles, observes *Digitæ eminere videntur et fulmen extra tabulam esse*. In all probability the arm here was foreshortened.

at large, and which requires the least portion of technical skill to decide upon.

Indeed, the state of sculpture alone among the ancients would almost furnish a conclusive proof that the sister art of painting could not be deficient in a qualification which the former so eminently possessed; more especially, as they both attained a high degree of perfection about the same period, and the most famous artist in each, flourished nearly at the same time. Among the ancient statues also that yet remain, expression is carried to a wonderful height; not merely the features of the face, but almost every muscle of the body, combining to enforce the idea intended to be conveyed. This may be remarked of the Laocœon, the slave listening to the Conspirators, the dying Gladiator, the Venus, Apollo, Hercules, Antinous, &c. wherein every portion of the performance is characteristic.

Mr. Webb\* very properly observes that “the  
“ ancients thought characters and manners so  
“ essential to painting that they expressly term  
“ picture, an art descriptive of the manners.†  
“ Aristotle in his Poetics‡ says of Polygnotus  
“ that he was a painter of the manners, and  
“ objects to Zeuxis, his weakness in this part.

\* On Painting and Poetry, 149.

† *Ἡρώων τῆς τέχνης*. Callisth. in Descrip. Stat. *Æsculap*.

‡ *Ἡρώων τῆς τέχνης*.

"We have in Philostratus\* the following description of a picture: 'we may instantly,' says he, 'distinguish Ulysses by his severity and vigilance; Menelaus by his mildness; and Agamemnon by a kind of divine majesty. In the son of Tydeus is expressed an air of freedom; Ajax is known by his sullen fierceness, and Antilochus by his alertness.' To give to these such sentiments and actions as are consequential from their peculiar characters is the ethic of painting."

Socrates in a dialogue with Parrhasius the painter which Xenophon has related, † after discoursing on the power of painting to express the characters and manners of mankind, advises him to paint those rather which are expressive of beauty, goodness and loveliness ‡ than their opposites: a proof that in the days of Parrhasius this part of painting was principally regarded. This was the Parrhasius who painted allegorically the genius (Demon) of the Athenians *varium, iracundum, injustum, inconstantem*. || It was he also who painted *pueros duos in quibus spectatur securitas et ætatis simplicitas*; an

\* Επιδηλοσομεν Ιθακαιοι, &c. Philostr. in Antilocho.

† Memorab. III. 10.

‡ δι ὧν τὰ καλὰ τε κάγαθα καὶ αγαπητὰ καὶ φαίνεται, καὶ δι ὧν τὰ αἰσχρὰ τε καὶ πονηρὰ καὶ μισητὰ.

|| Plin. XXXV. 36.



elegant description, on which some of Mr. Gainborough's paintings are the best comment. But it was Aristides the Theban\* who principally excelled in this sublime part of painting: *qui primus omnium animum pinxit et sensus hominis expressit, quæ vocant græci ethe; item perturbationes. Durior paulo in coloribus. Hujus pictura est oppido capto ad matris, morientis à vulnere, mammam adrepens infans: intelligiturque sentire matrem et timere ne emortuo lacte sanguinem lambat.*† We shall not easily find a production of modern art, superior to this. The same Aristides‡ painted also “a sick person, a  
 “performance that received boundless commen-  
 “dation. And so much was he admired in this  
 “department of the art, that king Attalus is said  
 “to have purchased one of his pictures at the  
 “price of one hundred talents.” It is evident that the value of this painting must have depended on exquisite expression.

\* Ibid.

† This is not very dissimilar to a beautiful thought in Dr. Langhorne's Country Justice.

Cold on Canadia's hills or Minden's plain,  
 Perhaps that mother mourn'd her soldier slain:  
 Bent o'er her babe her eyes dissolved in dew—  
 The big drops mingling with the milk he drew  
 Gave the sad presage of his future years,  
 The child of misery baptized in tears.

‡ Plin. ubi sup. *Pinxit et ægrum sine fine laudatum. Quæ in arte tantum valuit ut Attalus rex unam tabulam ejus centum talentis emisse traditur.*

Indeed,

Indeed, the praises of the ancient connoisseurs and the exertions of the greatest among the ancient artists seem principally turned toward expression. It was for this excellence, carried to a high degree, that the famous picture of the death of Iphigenia, by Timanthes,\* was so much valued. *Ejus enim Iphigenia, oratorum laudibus celebrata, quâ stante ad aras peritura, cum mæstos pinxisset omnes præcipue patrum, et tristitiæ omnem imaginem consumpsisset, patris ipsius vultum velavit, quem dignè non poterat ostendere.* Sir Joshua Reynolds,† after Voltaire and Mr. Falconer, has thought fit to blame a contrivance which all the ancient world admired. It is a trick, says he, that will serve but once; an artifice to evade difficulties which should have been overcome. I cannot help differing however from Sir Joshua in opinion, respectable as his sentiments are, for the following reasons. 1. The idea seems evidently to be taken from the passage in the Iphigenia of Euripides, where Agamemnon is represented by the poet as he is by the painter. 2. It became the haughty character of the “King of Men,” as Homer calls him, to veil from the sight of the by-standers, any appearance of human weakness, which a scene so melancholy might compel him to admit. 3. As the principal passion which the story would allow of was grief, and

\* Plin. *nb. sup.*

† Discourses. Dec. 10, 1778.

as a variation *ad infinitum* of this appearance was impossible, the method adopted by Timanthes seems to have been the most natural under the circumstances. 4. It is a known fact in human nature, the foundation of a known principle of art, that we are apt to conceive more highly of that which is concealed. 5. It left something to the imagination of the spectator, which should always be attended to, and was the common practice of Timanthes, the painter of this picture. *In omnibus ejus operibus intelligitur plus semper quam pingitur.* This is praise far beyond the general desert of modern artists. 6. The action itself was the most natural under the circumstances. Those who feel the most in a case of distress will be the most anxious to hide their feelings. The most ingenious device may be called a trick, and if frequently repeated may deserve reprehension.\*

Another instance of excellence in expression among the ancient paintings was the Medea of Timomachus. She was painted about to kill her infants. Ausonius speaks with admiration of the mingled expression of anger and maternal fondness in her face and manner. †

Immanem

\* Raphael has adopted the idea in a picture of a dead Christ, wherein the characters of grief being exhausted by the other figures, Mary Magdalen covers her face.

† Auson. Ep. 122. Sir Joshua Reynolds, in his Discourses, 8vo. p. 157, decries the attempt of producing an expression

Immanem exhaustit rerum in diversâ laborem  
 Fingeret affectum matris ut ambiguum.  
 Ira subest lachrymis, misratio non caret irâ;  
 Altere utrum videas ut sit in altere utro.

Neither is the degree less, though the object be more insignificant, alluded to in the following epigram of Martial.\*

expression of mixt passion. "A statue (says he) in which you endeavour to unite, stately dignity, with youthful elegance and stern valour, must surely possess none of these to a very eminent degree." It will be allowed that an attempt at a mixt expression of incompatible characters (as mildness and sternness, Herculean strength with the elegance and agility of the Farnese Apollo) would be vain. But it is certainly true, First, That certain mixt passions and characters exist in nature, and may be expressed by art: I think even his own instance to the contrary may. Secondly, The truth of a subject may admit, and the nature of it may demand this. Thirdly, Such expressions may be and often are more interesting than expressions of single character; nor do all cases require the excess of any particular character to be expressed. How can there be a good painting of a Christ, unless with an expression of dignity mixt with humility, or an evident absence of pride? A difficult, but certainly a possible expression; and far more sublime and interesting than any expression of simple character that occurs to my recollection, unless perfect benevolence could be well painted. *Je n'admire point un homme (says Pascal, Pensees, 279.) qui possède une vertu dans toute sa perfection, s'il ne possède en même temps dans un pareil degré la vertu opposée: tel que l'Epaminondas qui avait l'extreme valeur jointe a l'extreme benignité; car autrement ce n'est pas monter, c'est tomber. On ne montre pas sa grandeur pour estre en une extremité mais bien en touchant les deux a la fois et remplissant tout l'entredeux.*

\* Lib. III. Ep. 41.

Inserta

Inserta phialæ Mentoris manu ducta  
Lacerta vivit et timetur argentum.

If it be farther considered that in the great age of painting, when Zeuxis, Apelles, Timanthes, Protogenes, Aristides, flourished, gaudiness of colouring was reckoned a defect, nothing remained (in paintings that contained but a few objects especially) but *design* and *expression* whereon their fame could be built: nothing else would be a sufficient ground for the exclamation of Zeuxis,\* that he *painted at eternity*; the language of nature, which all men in all ages could judge of, must have formed the principal part of works which could be admitted to put in such a claim.

Notwithstanding however these Græcian artists paid an inferior attention to the COLOURING of their pictures, proof is not wanting from their writings to evince, that this department of painting was carried among them to a considerable degree of excellence. That they were in possession of a great variety of colours I have already proved, and mean more particularly to establish† in the second part of this paper,

\* In æternitatem pingo.

† From an examination of the passages respecting the ancient pigments and substances so used, in Dioscorides, Vitruvius, Pliny, Oribasius, Isidore, and Solinus (which though read at the Society, is too long to be conveniently

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paper, which contains a minute comparison of the ancient with the modern pigments. It is also

inserted in the present volume) I find, that of *white* colouring substances, the ancients had white lead variously prepared, a white from calcined egg-shells, and preparations from cretaceous and argillaceous earths. The moderns, in addition, have magistery of bismuth, little used; and *ought* to have, the calces of tin and zinc.

Of *blacks*, the ancients had preparations similar to lamp, ivory, blue and Franckfort black: also to Indian ink, and common writing ink, and they used what we do not, the precipitate of the black dyers' vats. Black chalk and black lead were, as I think, unknown to them.

The ancients possessed a species of vermilion or fine cinnabar, a coarser cinnabar, red lead, various reddles burnt and unburnt, apparently similar to our red oker, Venetian red, Indian red, Spanish brown, burnt Terra di Sienna and scarlet oker: they had also a substance alike in colour and in name to our dragon's blood. Their minium was not red lead, but native vermilion or very fine cinnabar. Their red lead went under the names of *minium secundarium*, & *cerussa usta*. They had not carmine or rose pink, nor the lakes from kermes, cochineal, or brazil; although they appear to have had the cochineal insect and the kermes berry. They were also accustomed to tinge calcareous and margaceous earths red, a practice which we do not use but for yellows.

The yellow pigments of the ancients were generically the same with our orpiments, king's yellow, Naples yellow, massicot and the yellow okers of various denominations, as well as the calcareous earths tinged yellow. They did not possess turbith mineral, mineral yellow, or gamboge, nor do they appear to have known of gall-stone as a pigment.

Of

also clear from the express assertions of Cicero,\* Vitruvius,† Pliny,‡ and Dionysius Halicarnassæus,|| that it became the fashion in the latter

Of the *blue* paints, they had preparations from the lapis cyanus and lapis armenus; perhaps also from the lapis lazuli, which they possessed, and which I incline to think a different stone from the former. Indigo they had, and perhaps bice and smalt, for they made blue glass, but whether from some ore of cobalt or of wolfram must be uncertain, perhaps the former. They had not Prussian blue; verditer nor litmus, which we have. We do not use the blue precipitate of the dyers' vats, nor mountain blue, which they certainly employed.

Of *green* colours, they had verdegriſe, terra verte, and malachite or mountain green. The latter is not in use among us. Sap green, green verditer, and Scheele's green appear to have been unknown to them. The modern Brunswick green is still kept secret. Like us also they procured as many tints as they pleased from blues, and yellow vegetables.

We have no *original purple* in use: that from gold by means of tin, though very good when well prepared, is too dear perhaps, and unnecessary. Their purple was a tinged earth.

Their *orange* or sandarac (red orpiment) we also possess. Hence there does not appear to have been any great want of pigments, or any very material difference between the colours they used and such as we generally employ. Perhaps the full effect of colouring may be obtained without the use of the exceeding brilliant pigments, depending chiefly on the proportion and opposition of tints.

\* De Orat. 3. † Lib. VII. cap. 5. ‡ XXXV. 32.

|| In Isæo. p. 167, edit. Oxon. Greg. Nazienz. Carm. 10. Webb.

period of the art, particularly with the Roman artists, to trust principally to their colouring. So that nothing can be more clear, than that they enjoyed the *means* of colouring well, except perhaps in the very early stage of painting.

It may not be amiss, however, at this period of our inquiry, to make some observations on the testimonies of ancient authors respecting the subjects of this essay. It is certainly true, that when the works of an ancient artist are praised for any real or supposed merit, the commendations will be relative to the degree of perfection to which the art had arisen at the time, and to the opportunities of information, the taste and judgment of the person who bestows them. Excellence will always be ascribed to him who leaves his contemporaries far behind, and those performances will often be considered as supremely beautiful which exceed in beauty all that have gone before.

In like manner a person of natural sensibility, but who has been accustomed all his life to performances of an inferior stamp, will be in raptures at any which much exceed the best he has heretofore been taught to admire; and whatever opportunities of information he may have, his evidence will not be of much weight, if he do not possess a sufficient degree of taste and judgment to use them properly.

In



In ascertaining therefore the degree of credit, due to the praises bestowed on any performance in a branch of the fine arts, we must take into consideration the general state of the art at the time, and the competence of the person who bestows the praise.

No slight degree of probability however may be attained on both these points, by attending to a circumstance not generally noticed, viz. that in an advanced state of the art, and when the observer is acquainted with his subject, the praise will seldom be given in loose, general and comprehensive expressions, but the terms in which it is conveyed will be characteristic and determinate, and often technical; they will frequently shew the state of the art by marking the subdivisions, and the skill of the observer by judicious discrimination. When added to these, the latter can resort for comparison to any existent standard of perfection, his praise may fairly be adopted in its full extent, and regarded as evidence upon the point in question.

Thus, if a modern were to commend the musical performance of a great master in some general terms, similar, or nearly so, to those before made use of concerning a musician of equal eminence by an ancient author, we should have no doubt whatever, from known collateral circumstances respecting the comparative states of the science, that a far higher degree of absolute

knowledge and skill would be implied in the praise of the modern, than we could reasonably ascribe to the commendations of the ancient. So also, if any person in the present day, were to praise very highly the musical skill of some performer of eminence, no great degree of credit would be given to the commendation, unless we knew before-hand the competence of the person who bestowed the praise, or unless the mode of commendation itself implied a certain degree of knowledge in the man who presumed to judge. The stile of commendation which Dr. Burney would adopt, would be very different from the praises of him whose knowledge was bounded by a boarding school minuet, or a Scotch reel.

To apply these observations to painting: It is clear from what has been already advanced, that with respect to the most difficult, the most fundamental, and the highest in rank among the departments of the art,\* the ancients were fully equal to the moderns; and their expressions of praise must be allowed to imply an equal degree of absolute skill, with similar expressions, if applied to the great masters of modern art. It is also clear that painting was extremely cultivated among the ancients, and that their good painters were more esteemed than artists of equal

\* Design and expression.

merit in modern times : \* that what we should term gentlemen-artists were frequent with them : † that many treatises were published on the art itself, and the various branches of it : ‡ that the expressions of the ancient connoisseurs evince much theoretical and technical knowledge of the art, and display a distribution of its parts almost

\* This seems evidently to have been the case with Zeuxis, Apelles, Protogenes, and some other of the great painters, the price of whose performances would now be deemed enormous ; one of Apelles' paintings for instance brought him twenty golden talents ; upwards of fifty thousand pounds. Pliny, in his account of Protogenes, mentions that when Demetrius besieged Rhodes, he gave orders to his troops to take care that Protogenes was not molested, saying, he made war not with the arts, but with the Rhodians.

† *Apud Romanos quoque honos maturè huic arti contigit, &c.* he proceeds to enumerate several persons of note who had formerly been painters. See. also XXXV. 9. and XXXV. 36. § 9. In XXXV. 40. is an enumeration of female painters.

‡ *Hanc ei (Parrhasio) gloriam concessere Antigonus et Zinocrates qui de picturis scripsere.* Plin. XXXV. 36. Antigonus wrote *περὶ πίνακων*. (*De Tabulis*). *Diog. Laert.* in *Chrysippo*, p. 209. Nicias, the painter, appears also to have written on the subject : *Nicias scripsit se inuisse ; tali enim usus est verbo.* Plin. XXXV. 10. Euxenidas, *Ibid.* XXXV. 36. § 9. Pamphilus of Macedon *in πικτῶν ὅλβις* *literis eruditus præcipuè arithmeticè et geometricè sine quibus negabat artem perfici posse. Docuit neminem minoris talento annuo.* The subsequent part of the passage affords strong

almost as minute, complete and scientific, as the present state of it can boast.\*

When Plutarch, therefore, relating the dispute of the two painters, Parrhasius and Euphranor, tells us that Euphranor objected to his rival, that the Theseus painted by Parrhasius, looked as if he had been fed with roses, while his own seemed fed on flesh : † and when

proof of the high estimation in which the art was holden. Plin. ub. sup. *Apelles picturæ solus propè quam ceteri omnes contulit; voluminibus etiam editis quæ doctrinam eam continent.* ub. sup. *Euphranor Isthmius volumina quoque composuit de symmetriâ et coloribus.* Ib. XXXV. 40. *Geminus*, the Rhodian also, in Cicero's time, wrote on perspective.

\* It will appear from passages introduced in illustration of the various parts of this essay that the ancient writers, in speaking of painters, praise or blame them with evident judgment and discrimination: that they notice the several schools of painting: that they expressly mention and remark upon the science of light and shade; correctness of outline; anatomical proportion; invention; expression; ordonnance or composition; relief; coutume; perspective; handling; tone of colouring; harmony of colouring; softness and mellowness, and chalkiness or hardness of colouring; that they praise Apelles in particular for sobriety and chasteness of colouring, and inveigh against the opposite fault; and these in apposite and technical expressions evidently exhibiting much knowledge of the subject.

† *Ευφρανὼρ τὸν Θησεῖα τὸν αὐτῷ τῷ Παρρῆσιε παρεβόλε λέγειν τὸν μὲν ἐκεῖνε ρόδα βεβρωμέναι, τὸν δὲ αὐτῷ κρεῖα βοεῖα.* Plut. *Bellone an pace clariores fuerunt Athenienses.* Webb, 85. See also Plin. XXXV. 40. where the same anecdote is mentioned.

Pliny

Pliny\* gives an account of the two warriors painted by Parrhasius, where the perspiration of the one and the anhelation of the other were so visible and natural: when the naked hero of Apelles† is said to challenge nature herself; and when Propertius can find no greater compliment to pay to his mistress' complexion, than to compare it with the tints of that artist:‡ we can hardly refuse them a competence of judgment in a point, where examples of ultimate perfection were frequently presenting themselves. This at least must be allowed so far as the carnation tint was concerned. ||

There is also good reason to suppose, from the passages adduced in the beginning of this essay, which give an account of the painting of flowers, peacocks, &c. among the ancients,

\* *Sunt et duæ picturæ ejus nobilissimæ, hoplites in certamine ita decurrens ut sudare videatur; alter arma deponens ut anhelare sentiat. XXXV. 35.*

† *Pinxit et heroa nudum, cæque picturâ naturam ipsam provocavit. Ibid.*

‡ *Qualis Apelleis est color in tabulis.*

|| This would be true even though the ancients and the moderns had different notions of the carnation tint, owing to the difference in the standard from difference of climate: which however would be very slight. They appear to have made accurate distinctions on this point: *color in niveo corpore purpureus: purpureus ore rubor, &c.*

that

that they had arrived at no slight degree of skill in the *bandling* of subjects of this kind.

The following passage\* from Lucian shews a considerable degree of attention paid to the colouring of flesh, the object on which painters in general have found it most difficult to succeed.

“Lycinus: You shall see; and first from the  
 “Cnidian Venus I shall take the head alone;  
 “the body being naked, we have no occasion  
 “for the forehead, hair, and perfect shape of  
 “the eye-brows exactly as Praxiteles has made  
 “them, together with that swimming,† softness  
 “and vivacity of the eyes which he has so finely  
 “represented. The cheeks, the look of the  
 “full face, with the extremities of the hands,  
 “the fine proportioned wrist, and the delicate  
 “fingers growing thin at the tips from Alca-  
 “menes. Phidias and his Lemnian will supply

\* The passage is in his dialogue entitled “EIKONES, *Imagines*,” at some little distance from the beginning: *Λυ. και μεν ηδη σοι οραν παρχει γιγνομενην*, &c. Turnbull has quoted it, (*Ancient Paintings*, Preface, p. 2.) I adopt Francklin’s translation; though somewhat too hasty and free, and not exhibiting the precise meaning. In the present case however it is better than Turnbull’s.

† Francklin justly remarks “that the Greek expression is inimitably elegant *Οφθαλμων το υγρον αμα τω φαιδρω* *Oculorum mobilem bilaremque gratiam*”—Like Horace’s *vultus nimium lubricus aspicit*.

“ us with the general turn of the countenance and  
“ size of the nose ; the mouth and neck we will  
“ take from his Amazon. Calamides shall fur-  
“ nish us with the modesty of his Sofandra,  
“ the sweet half smile on her countenance, and  
“ the well folded, becoming robe. Her head  
“ however shall be undressed; and her age about  
“ that of Cnidian Venus of Praxiteles. What  
“ think you, my friend, will not the picture  
“ be charming, if well finished ?

“ Polystratus : Are you sure, my friend, you  
“ have omitted nothing in the composition of  
“ your beauty ?

“ Lycinus : Not that I know of, unless per-  
“ haps you think it cannot be complete without  
“ the proper colouring. There indeed we must  
“ be deficient : for how shall we procure it ?  
“ Shall we call in all those painters who are  
“ famous for blending their colours with taste  
“ and judgment, Polygnotus, Euphranor, Ætion,  
“ and Apelles ? Let these divide the task.  
“ Euphranor shall lend us his Juno’s hair ; Po-  
“ lygnotus, the handsome eye-brow and rosy  
“ cheeks of his Delphian Cassandra. He too  
“ shall furnish us with a robe of the finest work,  
“ most of it flowing in loose folds, and succinct  
“ only where it ought to be so. The rest of the  
“ body we shall take from the Pacata of Apelles,  
“ with a skin not too pale and fair, but shewing  
“ the blood within ; while Ætion shall give us  
“ the lips of his Roxana.”

These

These praises, however, relate chiefly to the stile of colouring of the ancient painters, as exerted upon single figures or particular tints. It may therefore be doubted, whether the ancients were possessed of the art of distributing their colours through the whole of a picture so as to produce an harmony and general tone of colouring similar to that which we admire in the Lombard and Flemish schools. I confess I am not perfectly decided upon this point. The present remains of ancient paintings do not appear to warrant any such conclusion, but their authority is very small when alleged *against* the general or particular merit of the ancient artists; being undoubtedly the works of inferior hands. I incline however, upon the whole, to think that the ancients did attend to this technical branch of colouring, chiefly upon the authority of the extracts I am about to adduce.

Indeed the modern technical expressions appear borrowed from the following passage of Pliny,\* which I have been almost tempted to regard as decisive on the subject. *Tandem sese ars ipsa distinxit, et invenit Lumen atque umbras, differentia colorum alternâ vice sese excitante. Dein adjectus est splendor; alius hic quam lumen; quem quia inter hoc et umbram esset appellaverunt tonon. Commissuras verò colorum et transitus, harmogen.*



It would be difficult to express more accurately, in plainer language, or in fewer words, the *light and shade*\* of a picture; the general *tone* of colouring, and the *bandling*, or skilful blending and softening of colours into one another. It should seem clear from this passage, that the ancients paid an attention to the colouring of a picture as a *whole*; and that they not only adjusted the artificial subordination of lights and shades, but the management of the various colours, so as to produce a distinct *general* effect. There are, however, many other passages among the ancient writers, which will induce us to conclude that they were acquainted with the general theory of colouring. Lucian,† in his fine description of that spirited painting by Zeuxis of the male and female Centaurs, after relating the treatment of the subject itself, proceeds to notice the technical execution of the picture: and he praises

\* I should have regarded the *Lumen atque umbras* of this passage as merely descriptive of the light and shade necessary to relieve single figures, if it were not for the subsequent definition of *tone*. The *harmogen* of Pliny, I take to mean the *bandling*, or the stile of pencilling, so as to leave a degree of finish or otherwise upon the picture, rather than what we now call *harmony*, or the use of such tints in such masses or proportions, and in such parts of the picture respectively to each other as fall well in unison together, and unite to make the painting seem a *whole* as to the colouring of it.

† In his Zeuxis.

particularly

particularly the truth and delicacy of the *drawing*: \* the perfect blending of the colours: † the skilful *shading*; ‡ the scientific preservation of size and magnitude: || and the equality and harmony of the proportions throughout the whole piece. § Zeuxis having publicly exhibited this picture, and finding it was praised by the people for the novelty and ingenuity of the subject only, and that its skilful execution as a painting was lost upon them, ordered his pupil to cover it up and take it home.

Painters (says Plutarch ¶) increase the effect of the light and splendid parts of a picture by the neighbourhood of dark tints and shades. And

\* οιον το απολιναι τας γραμμας ες το ευθυτατον.

† των χρωματων ακριβην την κρασιν.

‡ σκιασαι ες δεον.

|| της μεγεθους τον λογον.

§ την των μετρων προς το ολον ισοηλια και αρμονιαν: this seems to relate to all the before-mentioned parts: if so, note † implies harmony of colouring, and note ‡ the science of light and shade.

¶ De descrip. Adul. et Amici, οι ζωγραφοι, &c. Pictiores lucida et splendida, umbrosis et tenebrosis intendunt prope constituentes. Again, περι ευθυμιας. διει χρωματων, &c. Oportet iis qui colores hilares et splendidos proponunt abscondere tristitia et reprimere. Deleri enim omnino nequeunt nec mutari possunt. Junius, 170. This last passage however may be taken both ways.

Maximus

Maximus Tyrius \* observes that bright and vivid colours are always pleasant to the eye, but this pleasure is always lessened if you omit to accompany them with somewhat dark and gloomy. These passages seem to imply a knowledge of the use of cold and dark tints even where a brilliancy of tone was required. The best among the ancient painters, however, seem to have preferred a chaste and sober stile of colouring to the gaudiness and flutter of the later artists. And it is worth notice, that in this respect the progress of the art has been exactly similar among the ancients as among the moderns. The older artists of both periods, and those who have established the highest reputation for excellence in the sublimer walks of the art, seem in a great degree to have neglected colouring, and constantly bestowed an inferior share of attention upon it. The lower class of painters, and the later schools, those who paint to the eye rather than to the mind, have principally excelled in that which their superiors neglected. Among the ancients, Zeuxis, Apelles and the earliest and best of the artists appear (at least frequently) to have trusted to four colours only. Apelles went so far as to cover his paintings with a brown varnish to give them the desired mellowness and sobriety of tone: *Unum† imitari nemo potuit quod absolutè opera atramento*

\* Dissert. 35. ο σφραγισμὸς φιδον, &c. † Plin. XXXV. 35.

*illinebat*

*illinebat ita tenui ut id ipsum repercussu claritas colorum excitaret, custodiretque à pulvere et fordibus, ad manum intuenti demum appareret. Sed et tum ratione magne colorum claritas oculorum aciem offenderet veluti per lapidem specularem intuenti e longinquo: et eadem res nimis floridis coloribus austeritatem oculis daret.* I have already quoted Pliny's complaints that the Roman artists sacrificed every thing to colouring; and in the following passage he praises the opposite stile. *Nicie\* comparatur et aliquando præfertur Asbenion Maronites, Glaucionis discipulus, et austerior colore et in austeritate jucundior, ut in ipsâ picturâ eruditio eluceat.* To what can this *Eruditio* apply, but to technical skill in the particular province of colouring?† The analogy as to colouring, as well as in other respects, between the Greek painters among the ancients, and the Roman and Florentine schools among the moderns on the one hand; and between the ancient Roman artists, and the Venetian and Flemish schools on the other, will be sufficiently obvious.

\* XXXV. 39.

† I would observe that Pliny (as it seems to me) generally applies the terms *durus*, *durior* where the colouring was chalky or the handling harsh. The term *austerior* I think implies what the moderns would term chastity or sobriety of colouring. Where the handling was smooth and laboured, it is implied in the *Commixtura & Corruptela Colorum*: which latter expression was also used for certain processes in the mechanical mixture of colours.

Upon

Upon the whole therefore, I think, with respect to colouring, as employed upon *single figures*, that as the ancients were fully as competent to judge of excellence herein as the moderns; as the expressions of the ancient connoisseurs are very warm in praise of the colouring of many of their painters; as they appear also to have attended very much to the art of colouring; and moreover, as probable evidence will be adduced that they attended to miniature painting, a considerable degree of merit may be allowed them in the use of the colours they possessed.

The duration of the art among the ancients and moderns seems nearly equal: in number, the modern artists I think are superior. Some advantage however both in the preparation and the number of the modern colours, and (perhaps\*) the introduction of oil painting may possibly have enabled the moderns to excel their predecessors in some small degree;† but  
I think

\* The ancient colours in *fresque* seem to stand better than the modern oil colours. Plutarch, in his life of Aristides, mentions the paintings in the temple of Minerva, which in his time (between five and six hundred years afterwards) retained their full lustre. Montfaucon, in a passage already noticed, mentions the colours of an ancient ceiling, painted in *fresque*, which continued *en grande vivacité*. So also does the grand painting in *fresque* of the battle between Constantine and Maxentius, designed by Raphael, and painted by Julio Romano.

† The principal advantage of *oil* painting seems to be that, in consequence of not drying so fast, it enables the

I think the evidence will not permit us to rate that superiority very high. With respect to colouring, *as a whole*, and independent of the other parts of the picture, it seems probable that the ancients did understand the effect of it: but we have not sufficient reason to conclude that they attended so distinctly to this branch of the art, or attained to the same degree of perfection in the practice of it, as many of the moderns have done. It must, however, be observed, that we can judge of the merit of the ancient painters from two species of evidence alone, viz. *discovered antiques*, and *expressions in the works of ancient authors*; both of which are extremely defective: it is allowed by every skilful person, who has viewed the remains of ancient paintings, that none of them seem to be the performances of superior artists, notwithstanding much merit in the design and accuracy in the drawing, which indeed seems to have been habitual to almost every ancient artist. The best among these paintings (according to Sir Joshua Reynolds) “the supposed marriage in the Aldrobandine palace,” is evidently far short of that degree of excellence undoubtedly implied in the descriptions of ancient authors, and which, from them, we are fairly led to expect.

Still more defective, if possible, is this last species of evidence: for we have no direct treatise of an artist to recur to his piece, and touch and retouch the colouring more frequently, and at longer intervals, than fresque painting, or any water colours. cise

tise remaining on the subject by any of the ancients, although many were composed by their artists. The passages from which we are to decide, are, either the cursory remarks of writers not expressly treating on the subject of painting, or the descriptions of those who, at best, can rank but as amateurs of a fashionable art. From these indeed we may pretty safely assert the degree of excellence which the passages imply, but we should reason very inconclusively, were we to *deny* them any higher or any other merit than appears to be strictly contained in these scattered observations. Let any one for a moment place the modern painters in his mind, in the same situation as the ancients, and he will quickly decide on the truth of these remarks.

CHIARO-'SCURO, or the art of placing and proportioning light and shade in such a manner as to produce a pleasing effect, independently of any other circumstance connected with the picture, has been commonly deemed a characteristic difference between the knowledge of ancient and modern painters. Indeed many of the earliest and best of the moderns, such as Raphael, Julio Romano, Poussin, Domenichino, either did not understand or did not attend to this striking part of the art, nor was the full effect of it known till the time of Rembrandt.

On this subject, the works of the ancients, now remaining, give little information: nor so

far as I can find do any one of them appear to exhibit indications that this branch of painting was either so well known or so much in vogue among the ancient artists, as to render the practice of it common among the performances of inferior painters, or such as were in common demand.

It must also be confessed that many of the passages usually adduced by the admirers of the ancients, as proofs of their knowledge in this respect, cannot fairly be taken as implying more than the shading necessary to give life and relief to single figures. These passages, however, it will be proper to cite, because, although they do not weigh much with me, others may deem them of more importance, and they will add to the mass of authorities respecting the state of the art of painting among the ancients.

Cicero, speaking of eloquence, says, *Sed habeat tamen illa in dicendo admiratio ac summa laus umbram aliquam et recessum quo magis id quod erit illuminatum extare atque eminere videatur.\**

Pliny says of a Jupiter, by Apelles, † *Digni eminere videntur et fulmen extra tabulam esse*: and of Nicias, ‡ *lumen atque umbras custodivit, atque ut eminere e tabulis picturæ maximè curavit*. In this passage indeed it might be doubted, whether the first sentence does not mean more than mere relief, especially as this is mentioned afterward.

\* De Orat. lib. III. † XXXV. 35.

‡ XXXV. 40.



To these may also be added the passages from Plutarch already quoted under the head of *colouring*, αἱ δὲ ζωγραφὶ ταῦτα ποιεῖν, &c. and διὰ χρωμάτων τα φαῖδρα, &c. That from Maximus Tyrius οὐ φθαλαμῶς φιλῶν μὲν χρωμάτων, &c. And the σκιασσαι εἰς δέον of Lucian.

Zeuxis, Polygnotus, Euphranor (says Philostratus\*) *umbras etiam atque spiritus necnon recedentia atque eminentia sua arte exprefferunt*. The same author says of the picture of Venus, † that “the goddess will not seem to be painted, but springs from the canvass as if she would be pursued.”

In paintings, says another author, ‡ the contour of the illumined part should be “blended with and lost in the shade, for on this, joined to the advantage of colouring, depend animation, tendernefs, and the similitude to truth.”

I think it will be evident, on examination, that all the preceding quotations may relate merely to the light and shade of single figures, without involving what is now called the science of the Clair obscure. There are many observa-

\* Ζευξίς, Πολυγνώτης, Ευφρανὼρ, το εὐσκιον, &c. Vit. Apol. Tyan. lib. II. cap. 9.

† οὐ φαίνεται, &c. De Pic. Veneris, lib. II. p. 810. Webb, 101. The passage here quoted by Mr. Webb is in the ΤΜΝΗΤΡΙΑΙ. Virgines Canentes.

‡ Theages Pythagor. apud Stobæum, Webb, 102.

tions, however, among the writings of the ancients, which go very near to prove, that this branch of painting was understood among them: that well known passage of Pliny, for instance, already quoted, affords no slight presumption to this purpose. *Tandem sese ars ipsa distinxit, et invenit lumen atque umbras differentia colorum alternâ vice sese excitante. Deinde adjectus est splendor: alius hic quam lumen. Quem quia inter hoc et umbram esset appellaverunt tonon.* The dark, the light, and the mezzotint are here evidently and accurately described.

Equally strong is that expression of Quintilian,\* (*Zeuxis*) *Luminum umbrarumque rationem invenisse traditur.* This cannot well be otherwise translated than by the *science* of light and shade.

Among the enumeration of paintings, by various masters, in Pliny, there are some which could only originate from a knowledge of the effect of light and shade in masses. Thus, by Echion, *Anus lampadas preferens.* Antiphilus, *Puero ignem confluente laudatus, ac pulchrâ alias domo splendente, ipsiusque pueri oræ.* Philiscus, *Officinam pictoris, ignem confluente puero.*†

Hence

\* Inst. Orat. lib. XII. cap. 10.

† To these also may be added, the picture of Jupiter, by Apelles, where the lightning seemed detached from the picture (*fulmen extra tabulam esse*). This great painter was particularly famous for producing effect by the representation

Hence, although I should by no means agree with the Abbe Du Bos,\* that the ancients at least equalled the most celebrated of the moderns in this part of the art, I cannot adopt the sentiment of the first authority in this kingdom, that it was entirely unknown to them. Sir Joshua Reynolds observes,† “ that what the  
 “ ancients appear to have most failed in is  
 “ composition, both in the art of grouping their  
 “ figures and the art of disposing the light and  
 “ shadow in masses. It is apparent that this,  
 “ which makes so considerable a part of modern  
 “ art, was to them *totally unknown*. If the great  
 “ painters had possessed this excellence, some  
 “ portion of it would have infallibly been diffu-  
 “ sed, and have been discovered in the works of  
 “ the inferior rank of artists, such as those whose  
 “ works have come down to us, and which may

sensation of lightning : *pingit et, quæ pingi non possunt, tonitrua, fulgura, fulgetraque*. Plin. XXXV. 35. I cannot help thinking this must have proceeded from a knowledge of, and a fondness for, the effect of light and shade in masses and contrast.

\* Quant au clair obscur et à la distribution enchantée des lumières et des ombres, ce qui Plin et les autres écrivains de l'antiquité en disent est si positif, leur écrits sont si bien circonstanciés et si vraisemblables, qu'on ne sauroit disconvenir que les anciens n'égalassent du moins dans cette partie de l'art les plus grands peintres modernes. *Reflexions Critiques*, vol. I. p. 367.

† Notes to Mason's Translation of Fresnoy, p. 95.

" be considered as on the same rank with the  
 " paintings that ornament our public gardens.  
 " Supposing our modern pictures of this rank  
 " only were preserved for the inspection of  
 " connoisseurs two thousand years hence, the  
 " general principles of composition would be  
 " still discoverable in those pictures; however  
 " feebly executed, there would be seen an at-  
 " tempt at an union of the figure with its ground,  
 " some idea of disposing both the figures and  
 " the lights in groups. Now as nothing of this  
 " appears in what we have of ancient painting, we  
 " may conclude that this part of the art was to-  
 " tally neglected, or more probably unknown."

So much of this extract as relates to grouping,  
 I shall have occasion to consider presently; as to  
 the rest, I think Sir Joshua rates the merit of the  
 ancient artists, whose paintings remain, somewhat  
 too high in the scale of comparison. Nor do the  
 accounts of the places where these paintings have  
 been found, warrant the supposition that they  
 were thus ornamented at any considerable ex-  
 pence public or private. The generality of them  
 consist of single figures; some of them of two or  
 three figures—generally relieved by an uniform  
 ground; and, except in (comparatively) a few in-  
 stances (such as the Aldrobandine Marriage, the  
 Sacrifice, the Nymphæa, and a few paltry land-  
 scapes) evidently designed as mere reliefs to a com-  
 partment, and answering, as near as may be, the  
 stuccoed

stuccoed ornaments in our modern rooms. Nor do any of them seem the works of artists equal in their day to those at present employed on the painted ceilings of private houses.\*

That some technical knowledge of the effect producible by *masses* of light and shade was possessed by the ancients, appears to me indubitable from the passages adduced; to what extent it was carried, cannot now be ascertained. In all probability they were much inferior in this respect to the moderns; otherwise, although much science of this kind could hardly be expected from the trifling performances that remain, much more would have occurred on the subject, more largely dwelt on, and more precisely expressed, among the observations of ancient authors on the best paintings of the ancient masters.

Neither is there sufficient evidence that the ancients were eminent in that other important branch of the *composition* of a picture, which consists in distributing the figures and objects in *groups* or masses; not merely so as to prevent the appearance of confusion, and assign to each figure the degree of prominence and action due to his respective importance in the story, but in such a manner also, that by their mutual connection with, and dependance on each other, no particular group, nor any single figure therein, shall appear complete of itself, but as parts only,

\* Such as those in Portland Place for instance, Harley-street, &c. in London.

harmonizing together to suggest at once the idea of a whole, and direct the eye of the spectator to the point represented.

There are no examples of this difficult branch of the art among the remaining antiques: and, indeed, from the paucity of the figures introduced in the generality of these ancient paintings, there is little room to expect them. In the "Aldrobandine Marriage," nothing of this appears; and although there is an evident attempt at grouping in the "Sacrifice," and most of the figures are somewhat regularly disposed in two large masses,\* there is nothing like a connection or subordination in the parts of the picture, or any tolerable union of the figures with each other, or the ground.

But what still more inclines me to doubt whether the ancients attained any degree of eminence herein, is, that among the many paintings of their great masters, enumerated by Pliny, Lucian, or Philostratus, I do not find any of them praised for this species of excellence. This indeed may as well arise from want of knowledge in the writer, as of skill in the artist.

\* The principal part of the figures in this picture are distributed in two triangular groups, formal, but not unpleasant. The perspective tolerably well preserved. The copy in the *Voyage Pittoresque de Sicile*, is not quite accurate, and more favourable than the print in the collection of Herculanean Antiquities, published by order of the king of Naples.

We

We are not therefore to conclude from thence that they were entirely ignorant of ordonnance, for it was hardly possible to paint, as they did, pictures containing a multitude of figures,\* without being compelled to adopt some artificial disposition of them. Indeed, this actually appears to have been technically attended to by them whatever might be their comparative excellence in it, for Apelles is expressly asserted by Pliny† to have been inferior to Melanthius in composition (*de dispositione*). And Quintilian‡ remarks that this same Melanthius was eminent for his *science* in painting, as the word seems to me to import. These however are the only passages that have occurred to me on this particular department of the art, and they shew, in a general way merely (but indubitably) that it was attended to as a technical division of painting, but how far cultivated, or to what degree of excellence it was carried, the present state of our knowledge will not enable us to determine.

\* One of their paintings (by Aristides the Theban), for instance, mentioned by Pliny, is said to have contained one hundred figures: this unweildy number must have been offensive, if they were not grouped with some skill.

† Melanthio de Dispositione cedebat; Asclepiodoro de Mensuris.

‡ Nam curâ Protogenes, *ratione* Pamphilus ac Melanthius, facilitate Antiphilus, concipiendis visionibus (quas *phantasia*; vocant) Theon Samius. De Inst. Orat. XII. 10.

By

By INVENTION\* I mean the talent of introducing such persons, objects and circumstances into a picture, as are requisite to tell the story in the completest manner, and most effectually to impress the idea intended to be conveyed.

From the connection between the sister arts of poetry, painting and sculpture, in this respect, and the admirable performances of the ancients in the other two departments of the fine arts, we might reasonably have conjectured that the ancient painters were not deficient in invention, although no specific proof of excellence in this respect had been transmitted to us.

Many of the instances indeed already adduced, under the heads of design and expression, may be

\* Sir Joshua Reynolds (Notes to Mason's *Fresnoy*, p. 75.) includes *composition*, under *invention*. "But here begins what in the language of painters is called INVENTION, which includes not only the composition, or the putting the whole together, and the disposition of every individual part, but likewise the management of the back ground, the effect of light and shadow, and the attitude of every figure or animal that is introduced, or makes a part of the work."

"Composition, which is the principal part of the invention of a painter, is by far the greatest difficulty he has to encounter."

This is not the *usual* meaning of invention. Ordonnance or composition being generally considered as a separate division of the art of painting. Ingenuity and skill indeed are here required, but the difference seems to be that ingenuity (as in composition) is employed in the arrangement of materials already collected; invention in discovering and creating the materials themselves.

regarded



regarded as proofs that the ancients were eminent also as inventors ; for it is not absolutely necessary to the exertion of this talent that an action should be described by means of a multitude of objects. \* On the contrary, the introduction of more figures or circumstances than are necessary to produce the full effect of the story, are decisive proofs that the artist is deficient in a qualification which comprehends as well the rejection of unnecessary as the introduction of parts necessary to the transaction. That invention, therefore, which is destitute of taste and judgment, can lay no great claim to our approbation.

Protopenes seemed perfectly aware of this. In his picture of a satire, leaning against a pedestal, he introduced on the top of the pillar a partridge painted so exquisitely that the eyes of the spectators were diverted from the principal figure. The painter observing this, defaced the object of so much attention. †

The contrivance of Timanthes, in his Iphigenia, I have already noted, and I do not see any sufficient reason to dissent from the praises it has hitherto received. Nor should the picture of the sleeping Cyclops, by the same painter, pass without commendation. *Sunt et alia ingenii ejus exemplaria, ‡*

\* The Laocoon of the ancients, and the group in Guy's hospital, by Mr. Bacon, are instances of this.

† Satyrus Anapavomenos. Plin. XXXV. 35. Strabo, lib. XIV. p. 652. *Kai au tu Hporoyne, &c.*

‡ Plin. XXXV. 35.

*veluti*

*veluti Cyclops dormiens, in parvulâ tabellâ: cujus et sic magnitudinem exprimere cupiens, pinxit juxta Satyros, Thyrsos pollicem ejus metientes. Atque in unius hujus operibus intelligitur semper plus quam pingitur, et cum ars summa sit, ingenium tamen ultra artem esse.* This is an evident distinction between, and a judicious preference given to genius and invention over mere technical acquired skill.

The picture of Hercules strangling the serpents in his cradle, by Zeuxis,\* is well imagined, and seems to have furnished the idea to the first of our modern artists, Sir Joshua Reynolds, who has represented the same subject, *Magnificus ejus est Jupiter in Throno, adstantibus diis, et Hercules Infans Dracones strangulans; Alcmenâ matre corâmpavente et Amphitryone.* It may be observed that the introduction of the deities in this picture (or in a subject of this kind) was by no means improper in a painter, who not only believed in their existence, but in all probability gave credit to the story itself.

A remark of the same kind may be made on the subject of a picture by Ætione, described by Lucian,† and from his description painted by Raphael. It represented the marriage of Alexander and Roxana; and we may venture to agree in opinion with the Abbe du Bos‡ respect-

\* Ubi sup.

† In his Herodotus, καὶ Αἰτιωνα φασὶ τοὺς Ζωγράφους, &c.

‡ Reflexions Critiques, vol. I. p. 360.

ing it, that for the charms of invention and elegance of allegory it exceeds the most lively productions of Albani.

Other instances might perhaps be collected in support of the pretensions of the ancient painters to invention, were it necessary to do so. But it will be sufficient perhaps to observe, in addition to what has already been urged on this subject, that as invention is rather a natural endowment than an acquired talent, and as the ancients universally seem at least equal to the moderns in the gifts of genius and good sense, we cannot but admit, on their part, an equality with ourselves, so far as invention is concerned.

Very nearly connected with the subject of invention is that of *COUTUME*: by which I mean an attention to probability (with respect to times, places, objects, persons, and circumstances) in the transaction represented.

The ancient paintings now remaining, indeed, so far from exhibiting any proofs of attention to this important branch of the art, are full of gross violations of probability, and representations of impossible connection. But I lay very little stress on these instances; first, because they are so evidently the performances of artists of no repute, and in the very decline of taste and good sense: secondly, because none of them, to which this objection can be made, are regular representations of any person or transaction, but  
merely

merely fancy pieces; and thirdly, because as they were (for the most part) manifestly intended as ornaments to apartments, the taste of the owner, and not of the artist, would of course be chiefly consulted. Nothing, however, can be more clear than that the ancients required an attention to probability in the works of their artists; and from the manner in which their writers express themselves on the subject (not so much recommending the practice, as taking it for granted), we may reasonably conclude that their best painters were seldom guilty of any gross violation of the coutume. *Sint ficta simillima veris* was an apothegm generally known, and where known, must have been universally admitted.

Indeed the principles of the coutume in painting are well expressed, and illustrated by Horace in the subsequent well known passage, and in such a manner also, that this alone would afford a probable presumption that the ancient connoisseurs were in the habit of expecting a strict attention to propriety in this respect.

Humano capiti cervicem pictor equinam  
 Jungere si velit, et varias inducere plumas  
 Undique collatis membris, ut turpiter atrum  
 Desinia in piscem mulier formosa superne:  
 Spectatum admissi, risum teneatis amici?  
 Credite, Pisones, isti tabulæ fore librum  
 Persimilem, cujus, velut ægri somnia, vana  
 Finguntur species.\*

\* De Art. Poeticâ. sub Init.

The

The same sentiments are expressed by Ælian, *Statuas et imagines* (says he) *quas nobis ars fictorum exhibet non oscitanter aut obiter spectare soleo. Nam in his etiam ars manualia iudicium aliquod sapientiamque adhibet. Atque id sic se habere cum ex multis alijs conjici potest tum ex eo potissimum quod nemo pictorum aut plastrum ausus lest unquam musis filiabus foris adulterinas atque alias species effingere: neque quisquam opificum tam est à ratione alienus, qui eas armatas exhibuerit.*

Still more directly to the purpose is the following very sensible passage from Vitruvius, whose good taste and judgment seems to have been greatly offended at the violations of probability which were beginning to gain ground in his time. *Neque picturæ* (says he\*) *probari debent quæ non sunt similes veritati; nec si factæ sunt elegantes ab arte. ideo de his statim debet repente judicari, nisi argumentationis habuerint rationes sine offensionibus explicatas. Etenim enim Trallibus cum Apaturius Allabandeus eleganti manu finxisset scenam in minuscule theatro quod ἐνδρακτάριον apud eos vocitatur, in eaque fecisset pro Columnis signa Centaurosque sustinentes Epythilia, Tholorum rotunda tecta, fastigiorum prominentes versuras, coronasque capitibus leoninis ornatas; quæ omnia stillicidiorum e. tectis habent rationem; præterea supra eam nihilominus episcenium in quo Tholi pronai semifastigia omnisque tecti variis picturis fuerat*

\* Lib. VII. cap. 5.

ornatus—itaque cum aspectus ejus Scenæ propter asperitatem eblandiretur omnium visus, et jam id opus probare fuissent parati, tum Licinius Mathematicus prodiit et ait Allabandeos satis acutos ad omnes res civiles haberi, sed propter non magnum vitium, indecentiæ insipientes eos esse judicatos; quod in Gymnasiis eorum, omnes quæ sunt statuæ, sunt causas agentes; in Foro autem, discos tenentes, aut currentes seu pila ludentes. Ita indecens inter locorum proprietates status signorum publicè civitati vitium existimationis adjecit. Videamus etiam nunc ne Apaturii Scena efficiat et nos Allabandeos aut Abderitas. Quis enim vestrum domos supra tegularum tecta potest habere aut Columnas, seu fastigiorum explicationes? Hæc enim supra contignationes ponuntur, non supra tegularum tecta; si ergo quæ non possunt in veritate rationem habere facti, in picturis probaverimus, accedemus et nos his civitatibus, quæ propter hæc vitia insipientes sunt judicate. Itaque Apaturius contra respondere non ausus est; sed sustulit scenam et ad rationem veritatis commutatam postea correctam approbavit. There is at least as much reason to cry out in the present day, as Vitruvius did at the end of this passage *Utinam Dii immortales fecissent ut Licinius revivisceret et corrigeret hanc amentiam*. The whole of the chapter from whence this extract is taken, is a dissertation on the coutume in painting and architecture.

But beside the speculative acquiescence in the rules of the coutume among the ancients, there

are

are not wanting instances of attention to them in practice, such as the contrivance of Nealcēs,\* who *cum prælium navale Ægyptiorum et Persarum pinxisset, quod in Nilo cujus aqua est mari similis factum volebat intelligi, argumento declaravit quod arte non poterat, asellum enim in littore bibentem pinxit, et crocodilam insipientem ei.* Mr. Webb,† with great truth, remarks on this artifice, that a modern artist with the same view would have planted at one end a river-god with water issuing from seven urns, with no small conceit of his erudition. In fact this clumsy expedient has been the resource of the greatest among the modern artists on similar occasions. Thus Raphael, in his painting of the passage through Jordan, has represented the river in the form of an old man dividing the waters. Poussin has done the same as to the very river in question, the Nile, in the picture which represents the discovery of the infant Moses; and an artist of the first merit in the present day‡ has described the river Thames under the same venerable form, among other allegorical representations equally objectionable. Whether the ancient

\* Plin. XXXV. 40. † Inquiry, 199.

‡ Mr. Bacon, on the monument of Lord Chatham in Westminster Abbey. This particular fault is observable also among the series of paintings in the room of the society of arts at the Adelphi.

painters put in practice a greater share of good sense with respect to coutume, than the moderns, cannot now indeed be accurately determined; hitherto the advantage seems to be in favour of the former, nor will the opinion of the superiority of the ancients herein be diminished by an enumeration of some other instances of the contrast from the works of modern artists. Nor is it at all necessary for this purpose to have recourse to names of inferior note, since the most celebrated of modern painters, from Raphael to Sir Joshua Reynolds, have been guilty of such flagrant breaches of probability and propriety, as would appear astonishing to those who are not in the habit of expecting them.

When Raphael, in his cartoons, introduces monks and Swiss guards: when he puts into a boat more figures than it is evident the boat could actually contain: when in the chastisement of Heliodorus, who attempted to despoil the temple at Jerusalem, Pope Julius the Second is depicted as being present: when in the donation of Constantine in the Vatican a naked boy is placed conspicuously in the foreground, astride upon a dog, in the immediate presence of the pope and the emperor: when Venetian senators are introduced while Pope Alexander excommunicates Barbarossa: when Aristotle, Plato, Dante and Petrarch are brought together in the school of Athens: to omit the lesser improprieties of shoeless apostles,



apostles, &c. every person must acknowledge that such offences as these against truths so obvious, if they do not arise from a defect of understanding, are instances of inexcusable carelessness.

In like manner, when the same great master paints the dreams of Joseph and his fellow-prisoner in circles over their heads; when similar contrivances to express future events are used by Albani, Parmeggiano and Fuseli, is it not evident that no possibility can make the fiction true? that real and feigned existences are unnaturally introduced in one narration?

When Polidore chooses to represent the death of Cato, and exposes to the spectator the hero of the piece, with his bowels gushing out; when Paul Veronese, at a banquet, painted with his usual magnificence, places before us a dog gnawing a bone, and a boy making water: however such disgusting circumstances may be forgiven in the *chef d'œuvre* of a Michael Angelo, had he represented these instead of the horrible figures in his day of judgment, the performance of an inferior artist cannot atone for them.

So also, when one of the first-rate among the modern painters already mentioned\* introduces Benedictine monks at the marriage of Cana; when in a picture of the crucifixion he puts the Roman soldiers in the jerkins of the sixteenth cen-

\* Paul Veronese.

tury, and adorns their heads with turbans ; when Guido, in a painting of Jesus appearing to his mother after his resurrection, places St. Charles Borromée in a kind of desk in the back ground, as witness to the interview ; when Tintoret, at the miraculous fall of manna, arms the Israelites with fusils ; and Corregio appoints St. Jerome as the instructor of the child Jesus : common sense revolts at the impropriety ; and we are compelled to exclaim *quicquid ostendas mihi sic, incredulus odi*.

The mythological taste of the *learned* Pouffin is well known ; but Reubens seems to claim the merit of having presented to the world a still greater number of supreme absurdities in this learned style : nor is it easy to conceive a more heterogeneous mixture of circumstances real and imaginary, sacred and profane, than the Luxembourg\* Gallery, and the other works of that great master perpetually exhibit.

But

\* In the Luxembourg Gallery (among other instances) when Mary de Medicis escapes from the castle of Blois, she is conducted by Minerva and the Duke D'Espéron. In the same collection, the city of Lyons goes to meet the queen who appears in the air with her son, somewhat like the kings of Brentford in the Rehearsal.

Le Seur, in his martyrdom of St. Stephen, adorns him with a rich cope, which had Stephen been a bishop would have been sufficiently well. He admits also the absurdity of representing him as perfectly inflexible in his joints as they carry him off.

Carlo

But it would be too tedious to enumerate all the great painters of modern ages who have egregiously offended against every precept of common sense in their admired productions; I shall therefore no longer disturb the ashes of the dead, but quit this part of my subject with a few observations on living artists.

When so great an authority as Sir Joshua Reynolds\* contends for the rejection of common sense in favour of somewhat that he terms a higher sense; when he laments, indirectly, that art is not in such high estimation with us, as to induce the generals, law-givers, and kings of modern times to suffer themselves to be represented naked, as in the days of ancient Greece; when he defends even the ridiculous aberrations from possibility which the extravagant pencil of Reubens has so plentifully produced; it is not surprizing that the artists of the present day should be led to reject the company of common sense; or that Sir Joshua's performances should furnish examples of his own precepts.

Carlo Maratti introduces Apollo playing on the violin to Minerva who comes to visit him; and Luca Giordano paints Tarquin in the Italian habit of the sixteenth century. The introduction of little loves and cherubim in paintings of real transactions is almost too common to notice.

\* Reynolds's Discourses, 8vo. p. 286.

Mrs. Siddons is represented by Sir Joshua in the character (as it is said) of the tragic muse: she is placed in an old fashioned arm chair; this arm chair is supported by clouds, suspended in the air; on each side of her head, is a figure, not unapt to suggest the idea of the attendant imps of an enchantress: of these figures, one is supposed to represent comedy, and the other tragedy; Mrs. Siddons herself is decently attired in the fashionable habiliments of twenty or thirty years ago.

If this be a picture of the tragic muse, she ought not to appear in a modern dress, nor ought she to be seated in an old arm chair. If this be a portraiture of Mrs. Siddons, she has no business in the clouds, nor has she any thing to do with her ærial attendants. If this be Mrs. Siddons in the character of the tragic muse, the first set of objections apply, for she is depicted out of character: if this be the tragic muse in the similitude of Mrs. Siddons, the second objections apply, for she is placed in a situation where Mrs. Siddons could never be.

In the death of Dido Sir Joshua introduces her sister lamenting over the corpse of the unfortunate queen—this is possible: but he has also introduced Atropos cutting Dido's hair with a pair of scissars, a being equally real and apparent in the painting with Dido or her sister: this appears to me a gross offence against mythological

logical probability: nor is it the only offence against the coutume with which that picture is chargeable.\*

It is needless to dwell on the anachronisms and improbabilities of West, in his painting of the Scotch king Alexander, hunting: or on the representation of dreams by Fuseli: or to notice at length the well known absurdities of his night mare or his Ghost of Hamlet: nor shall I take up the time of the Society with a particular examination of possible and impossible events—of sacred and profane mythology—of persons real and allegorical—transactions, serious and ridiculous—so pompously displayed in Mr. Barry's series of paintings at the Adelphi: to all of us these gross violations, of the plainest principles of common sense are well known, and I hope they will be the last instances of improbable concomitance with which the art of painting in this country will be disgraced.

\* I allude to the circumstances under which a cloud is introduced behind Dido's sister.

In Sir Joshua's painting of the infant Hercules among other objectionable circumstances that occur to my recollection are, the introduction of the lion's skin, so easy to be mistaken for an anachronism of the Nemean lion's—the introduction of personages unnecessary to the story—the near approach of one of the attendants to the dreadful mouths of the serpents—and the disgusting antithesis of the front and back view of the naked children.

There

There is one other breach of the coutume however common among painters, more gross and offensive than any of the instances hitherto alledged, I mean the perpetual and unnecessary display of the naked figure. I shall not stay to inquire whether more skill can be shewn in painting the human body clothed or unclothed. If the personages introduced in any picture are more naked in the representation than can be justified by the probability of times, persons, places, and circumstances, it is a breach of the coutume proportionate to the deviation. *This* fault however is so common, as hardly to be noticed: so slight indeed, when compared with that general taste for voluptuous imagery and obscene representation, which has so long disgraced the art of painting in every stage of its progress, that science and morality are callous to the *slight* offence.

This depravity of imagination—this prostitution of the pencil, to the base purposes of lascivious inclination, was a subject of much complaint among the ancients.\* Nor is there less

\* To what purpose shall we erect temples to chastity, says Propertius?

Quæ manus obscænas depinxit prima Tabellas,  
Et posuit castâ turpia visa domo;  
Illa, puellarum ingenuos corrumpit ocellos,  
Nequitizque suæ, noluit esse rudes!  
Ah! gemat, &c.

Propert. El. L. II. E. V. ver. 219.

Fait

less reason to complain in modern times, that this delightful art, which might be employed in exciting the noblest sentiments, and become subservient to the best interests of society, should so often be exercised upon subjects solely calculated to please the eye of the voluptuary and debauchée. It is hardly possible to pass through any admired collection, without meeting with some of these; of which, however excellent the performance may be, the common feelings of decency and morality (if we are neither professed

Fuit et Arellius Romæ celeber paulo ante divum Augustum; nisi flagitio insigni corrupisset artem, semper alicujus feminæ amore flagrans, et ob id deas pingens, sed dilectarum imagine. Itaque in picturâ ejus scorta numerabantur. Plin. XXXV. 37.

I agree entirely with the following note of Brotier, whose edition of Pliny I use. Pictoribus poetisque vulgare hoc vitium, homine semper indignum. Hujusmodi libidines in suâ villâ non esse pictas sibi gratulatur Sidonius Apollinaris, Epist. II. 2. *Non hic per nudam piætorum corporum pulchritudinem turpis prostat historia, quæ sicut ornat artem, sic devenustat artificem.* Plin. per Gabr. Brotier, 12mo. vol. VI. p. 381.

Whatever the private practice of the ancient painters might have been, we excel them in the enjoyment of a public seminary, under the patronage of the first names in the country: in which, the young votaries of the graphic art are taught to admire and delineate the unveiled beauties of a prostitute, hired for the purpose of exhibiting in the best light, *the female naked figure.*

artists

artists nor connoisseurs) prevent us from viewing them without a mixture of disgust.

*Et Pudor averfos texit velamine vultus.* •

I have dwelt thus long upon the subject of coutume because I deem it of great importance to the perfection of the art; and the breach of it, the most palpable fault of the superior painters of modern times: so far as the observations relate to the preservation of public decency, I hope and trust they will meet the concurrence of every friend to the welfare of society.

It has been doubted, whether the ancients were acquainted with the science of PERSPECTIVE. And indeed if the remains of ancient painting were alone to decide the question, it must be determined against them; for the works of the ancient painters now in the possession of the moderns, afford no proof of attention to the rules of perspective equal to the performances of a modern sign painter. The picture of the "Sacrifice," before-mentioned, among the Herculean antiquities, and the fourth of the prints which Bellori has published and described, taken from the paintings in the sepulchre of the Naso-nii, are barely tolerable: but the other landscapes (almost the only remaining antique paintings which admit of perspective) are grossly defective in this particular. So much so indeed,

• Abbè de Marfy.

that



that considering the late period\* when landscape painting was introduced among the ancients, together with this manifest imperfection in point of perspective, of such as are yet extant, we cannot help suspecting the inferiority of the ancients in this respect. In perspective, as in Chiaro'scuro, had good practice been common, some traces would have been discovered in the works of their lowest artists.

And yet some general knowledge of the principles, and some degree of attention to the practice of perspective, cannot well be denied to the ancients. They were good mathematicians.† They were excellent architects;‡ some of them are celebrated for their skill in scene painting.¶ Geminus, the Rhodian, cotempo-

\* Non laudando et Ludio qui divi Augusti Ætate primus instituit amœnissimam parietum picturam, villas et porticus, ac topiaria opera, lucos Nemora, Colles, Euripos, amnes, &c. This *may* indeed imply that he was the first who painted the walls of houses, but the other appears to me the true meaning.

† Witness, Archimedes, Diaphantus, Euclid, &c.

‡ This is sufficiently evident: it has often occurred to me, however, that the rules of perspective are reversed in the respective situations of the five orders: the nicest work and that which will bear the minutest inspection (the Ionic and Corinthian), are placed at the top, and the doric order at the bottom of a building.

¶ Agatharcus, Democritus, Anexagoras. Vitruvius præf. ad, lib. VII. Also Claudius Pulcher. Plin. XXXV. 7. I shall have occasion to quote these passages at length.

rare

rary with Cicero (as I have already observed), was the author of an express Treatise on Perspective, as were also, Euclid, Heliodorus Larisseus, Agatharcus, and his disciples Democritus and Anexagoras. And the quotations I am about to adduce will render it extremely probable that an attention to perspective was expected in the works of the ancient artists.

Plato, in his dialogue entitled the Sophists, observes that “ painters and sculptors attempt  
“ to, preserve the real proportion of beautiful  
“ objects. You know that those which are placed  
“ in a certain point of elevation, would appear  
“ to us too small, and others placed lower, too  
“ large; the one being seen near at hand, the  
“ others at a distance. Hence artists at present  
“ pay no regard to the real truth, nor do they  
“ give to their figures their real size, but those  
“ proportions only which will conduce to a  
“ beautiful effect.”\*

Agatharcus (says Vitruvius†) *primum Athenis Æschylo docente tragediam scenam fecit; et de eâ re commentarium reliquit. Ex eo moniti, Democritus et Anexagoras, de eadem re scripserunt, quemadmodum oporteat ad aciem oculorum radiorumque extensionem*

\* Edit. Steph. tom. I. p. 235. This passage is also noticed by the Abbè Salier in his paper on the perspective of the ancient painters and sculptors. Mem. de l'Acad. des Inscip. VIII.

† Pref. ad, lib. VII.

*certo loco centro constituto ad lineas naturali ratione respondere: uti de incertare certæ imagines Ædificiorum in scenarum picturis redderent speciem; et quæ in directis plenisque frontibus sint figuratæ, alia abscedentia alia prominentia esse videantur.* This passage is decisive to prove that perspective was reduced to a science among the ancient artists. The passage herein before quoted from Vitruvius, under the division of the coutume, furnishes another proof of skill in perspective scene-painting. So also does the instance of the bull, by Pausias, painted in front on a black ground and foreshortened.

Pliny also notices a scene-painting with much commendation,\* *Habuit et scena ludis Claudii Pulcbri magnam admirationem picturæ cum ad tegularum similitudinem corvi decepti imagine advolarent.* Indeed the ancients appear to have arrived at considerable skill in the management of their scenes; which consisted like ours, both of scenes to draw aside, and scenes in parts jointed, such as are used in our pantomimes. *Scena aut versilis erat, aut duëtilis. Versilis tunc erat, cum subito tota machinis quibusdam convertebatur et aliæ picturæ faciem ostendebant. Duëtilis tunc cum tractis tabulatis hac atque illac species picturæ nudabatur interior.*†

\* Plin. XXXV. 7.

† Servius ad vers. 24. lib. IVti. Georgic.

I have already observed that Appelles is said to have been inferior to Melanthius in composition, and to Asclepiodorus in perspective; the passage (which I think will bear no other meaning) is as follows: \* *Melantbio de dispositione codebat, Asclepiodoro de mensuris, hoc est quanto quid à quo distare deberet.*

The similar expressions of Zeuxis,† and Philostratus‡ appear to me to require the same explanation.

I conclude therefore, that the ancient painters, especially the first rate of the artists, and those employed in painting scenes for exhibitions at public games, &c. must have attended to and possessed considerable knowledge of the science of perspective; nor indeed could the eye have been so perpetually inured to the repre-

\* Plin. XXXV. 35.

† τὴς μεγάλῃς τοῦ λόγου καὶ τῇ τῶν μέτρων πρὸς τὸ ὅλον ἰσότητι καὶ ἀρμονίᾳ magnitudinis rationem et mensurarum totius operis æqualitatem atque harmoniam. Lucian. Zeuxis.

‡ “How pleasing, says Philostratus, is the art of the painter: for having manned the walls with armed soldiers, he presents some entire, some half figures: of some we see the breasts, now the helmets, and last of all the spears. This is proportion young man (αἰολοῖα ταῦτα ὡ παῖ) for the objects must thus steal from the eye as it follows the several groups through their proper gradations.” Εὐν το σοφισμα τῆ Ζωγραφικῆς, &c. Philost. lib. I. p. 768. Webb, 112. The passage here quoted by Mr. Webb is in the Menæcius.

sentation

sentation of objects, and these frequently so numerous in one picture, without acquiring, almost imperceptibly, a considerable degree of skill in the perspective disposition of them. It is certain however, that the inferior artists among the moderns are much superior, in this respect, to those of the same class among the ancients.

We have very few means of deciding accurately concerning the merit of the ancients in PORTRAIT PAINTING ; which appears however to have been much practised by the most eminent among the ancient artists. Nor indeed is it likely that that branch of the art should be neglected at any period of the progress of painting, to which the origin of the art itself\* is with great probability ascribed.

Portrait painting seems to have been a principal employment of the first artist whom the ancients have to boast of. Alexander is said to have permitted no painter but Apelles, and no sculptor but Phidias to take his likeness;† and

\* And indeed of modelling. Dibutades Sicyonius figuræ primus invenit Corinthi filix operæ. Quæ capta amore juvenis illo abeunte peregrè, umbram ex facie ejus ad lucernam in pariete lineis circumscripsit: quibus pater ejus impressâ argillâ typum fecit et cum ceteris fistilibus induratum igni proposuit. Plin. XXXV. 43.

† Quint. Curt. lib. II. cap. 6. Plut. vit. Alex. Plin. XXXV. 36: Alexandrum et Philippum quoties pinxerit enumerare supervacuum est.

Pliny particularizes several instances of the skill of Apelles as a portrait painter.\*

Apelles, however, was far from being the only portrait painter of eminence even in his day; for his cotemporary Aristotle, alluding to portrait painters, says, that Polygnotus flattered, Dionysius adhered to truth, and Pauson made his likenesses inferior to the originals.† Nor was portrait painting less in vogue among the Romans than among the Greeks. Marcus Varro appears from a passage in Pliny (if I understand it aright) to have published a book with the portraits of seven hundred illustrious men;‡ and

Lala,

\* Plin. XXXV. 36. Imaginem adeo similitudinis indiscretæ pinxit ut (incredibile distu) Apion Grammaticus scriptum reliquerit, quemdam ex facie hominem addivinantem (quos metoposcopos vocant) ex iis dixisse, aut futuræ mortis annos aut præteritæ. Non fuerat ei gratia in comitatu Alexandri cum Ptolomæo: quo regnante Alexandriam vi tempestatis expulsus, subornato fraude plano regio invitatus ad cænam venit; indignantique Ptolomæo, et vocatores suos ostendenti, ut diceret à quo eorum invitatus esset, arreptoque carbone extincto è foculo, imaginem in pariete delineavit, agnoscente vultum plani rege ex inchoato protinus. Pinxit et Antigoni regis imaginem, &c. &c.

† Poetics. περ. 6. Πολυγνώστῳ μὲν κριτικῶς, Πάυσον δὲ χερῶς Διονυσίου δὲ ὁμοίως εἰκάζει.

‡ Imaginum amore flagrasse quosdam, testes sunt et Atticus ille Ciceronis edito de his volumine, et Marcus Varro

Lala,\* a female artist, who painted at Rome, is celebrated for the expedition with which she painted; and her skill moreover is said to have been such as entitled her to a higher price than was paid to the two most famous portrait painters of that day: which implies that portrait painters were numerous, and the practice flourishing. Lala was chiefly employed on female portraits, and a picture of hers is particularly noticed wherein she painted herself at a looking glass. The large portrait upon canvass, which Nero ordered to be painted of himself, one hundred and twenty Roman feet in height, has already been noticed, and the subsequent passage in Pliny respecting Nero's freed man, contains an instance of the

Varro benignissimo invento, insertis, voluminum suorum fecunditati, non nominibus tantum septingentorum illustrium, sed et aliquo modo imaginibus, non passus intercidere figuras, aut vetustatem ævi contra homines valere. Inventor muneris etiam diis invidiosi, quando immortalitatem non solum dedit, verum etiam in omnes terras misit, ut presentes esse ubique et credi possent. This passage appears to me to imply more than a *verbal* description of the persons mentioned by Varro.

\* Lala Cyzicena perpetua virgo Marci Varronis juventutem Romæ et penecillo pinxit et cestro in ebore; imagines mulierum maximè, et Neapoli anum in grandi tabulâ: suam quoque imaginem ad speculum. Nec alius velocior manus in pictura fuit: artis verò tantum et multum manipretio antecederet celeberrimos eadem ætate imaginum pictores Sopolin et Dionysium quorum tabulæ pinacothecas implent.

public use of portrait painting, which fully proves this branch of the art to have been very fashionable at that period.\*

In the drawing and colouring of single figures the ancients (as appears from the preceding pages) must be allowed equal merit with the moderns, and the passages just quoted will furnish no improbable ground of conjecture that they were equally successful in expressing the resemblances of persons. Spirit and animation, ease and dignity, the ancient statues and paintings still remaining most evidently evince were *common* to the performances of ancient artists; and as they possessed therefore all the requisites to excel in portrait painting, a branch of the art at all times much in request among them, there is good reason to infer in favour of the ancients, at least an equality with the moderns in this respect.†

\* Et nostræ ætatis infaniam in pictura non omittam. Nere princeps jusserat Colosseum se pingi CXX. pedum in Linteo, incognitum ad hoc tempus. Ea pictura cum perfecta esset in maianis hortis, accensâ fulmine cum optimâ hortorum parte conflagravit. Libertas ejus cum daret Antii munus gladiatorum publicas porticus invasit picturâ ut constat gladiatorum ministrorumque omnium veris imaginibus reditis. Plin. XXXV. 33.

† Pliny makes distinct mention of those who were celebrated for painting *small pictures*; many of whom appear to have been portrait painters. Whether these small pictures (*tabulæ parvæ* & *tabulæ minores*) were of a size to be regarded as of the same class with the modern miniatures, I can find no ground of conjecture. Vide XXXV. 37.

The



The same praise however can hardly be afforded them as *landscape painters*, a branch of the art adopted at a late period, and in which the ancients appear to have been singularly deficient. Ludius, in the time of Augustus, is mentioned by Pliny as the first professed landscape painter, and the kind of praise given to him, does not convey to a modern reader any very high idea of the taste of the author, or the skill of the painter.\*

I have before observed that our only knowledge of the state of painting among the ancients must be derived from expressions in the works of ancient authors, or the remaining performances of ancient artists. Both these species of evidence (so far as I have found) are decidedly unfavourable to the pretensions of the ancients as landscape painters. Ludius is the only person whom I can find mentioned as having attended to this branch of painting: he lived in the time of Augustus Cæsar, when the art of painting was rather declining than advancing: we hear of no subsequent painter of his school: the terms in which he is mentioned do not exhibit that knowledge of the subject which is conspicuous in the expressions of Pliny, when he notices the performances of eminent painters in other styles: it is

\* *Non fraudando et Ludio*, &c. already quoted from Plin. XXXV. 37.

also expressly mentioned of Ludius, that he painted upon walls (*parietum picturam*) and that he ornamented them at a slight expence (*minimoque impendio*). It is not thus that a modern connoisseur would mention the performances, of Salvator Rosa, Claude, Pouffin, Wilfon or Louthenberg.

Nor do the remaining performances of ancient artists, that can in any wise rank under the denomination of landscapes, convey a superior idea of their skill. The paltry grotesque paintings of this kind that are to be found among the remains of Herculaneum, and copied in the collection of Herculanean antiquities are unworthy the lowest class of modern painters; nor do the Nymphæa, or the paintings in the sepulchre of the Nasonii (so far as we can decide from the copies of Lucas Holstenius and Bellori\*), much advance the reputation of the ancient artists. The evident want of skill in the grouping of the objects, in the proportion and disposition of the light and shade, in the perspective, in the drawing, and in every other part of these performances is below criticism.

The antique paintings yet remaining, are certainly the works of inferior artists;† but the spirit, ease and correctness of the drawing, the

\* Græv. Tom. XII.

† Winckelman Hist de l'Art. vol. II. p. 109, &c.

force and propriety of the expression, and in some cases the praise due to the colouring, evince a degree of skill, which, in the superior painters, must have been very considerable indeed, since we see it possessed in this degree, by artists of no eminence, and in performances executed in the very decline of the art. But of landscape there is not one trace of the pencil remaining which should lead us to infer the least portion of excellence beyond what we see.

Of the COMIC and SATIRICAL paintings among the ancients, I can find no mention, except of one Calates, who appears to have painted comic subjects on miniatures, and Antiphilus a miniature painter also, who having caricatured some person of the name of Gryllus, these kind of paintings were afterward denominated Grylli.\* There are no traces however of any thing among the ancients which can bear the slightest competition with the labours of an Hogarth, or even the diurnal assemblage of satirical performances which croud a modern print-shop.

Pyreicus seems to have been the Teniers of the ancients.†

Of

\* Parva et Callicles fecit: item Calates comicis tabellis. --- Idem jocofo nomine Gryllum deridiculi habitus pinxit: unde hoc genus picturæ Grylli vocantur. Plin. XXXV. 37. Vide Pittura antice d'Ercolano, tom. III. Tavol. 26. where some paintings of this kind are copied.

† Namque subtexi par est minoris picturæ celebres in penecillo, e quibus fuit Pyreicus arte paucis postferendus:

Of the MODES of PAINTING among the ANCIENTS. The paintings of the ancient artists were either moveable (*tabulae, tabulas pingere*) or upon the ceilings or compartments of buildings (*parietes, lacunaria, cameras pingere*).

Pliny says that none of the artists were eminent except those who painted moveable pictures,\* but many of the great artists among the ancients, nevertheless, painted also upon walls, as Pamphilus, Apelles, Polygnotus, Pausus, Onatas, &c.

The pictures (*tabulae*) were either on fir-wood,†

proposito, nescio an destruxerit se; quoniam humilia quidem secutus, humilitatis tamen summam adeptus est gloriam. Tonsitrinas, sutrinasque pinxit, et asellos et obsonia ac similia: ob hoc cognominatus Rhyparographus; in iis consummata voluptatis, quippè ex pluris veniêre quam maximæ multorum. Plin. ubi sup. The *pinxura minor* here, is evidently from the context, not the *inferior style*, but the *smaller kind* of painting.

\* Sed nulla gloria artificum est nisi eorum qui tabulas pinxere, &c. XXXV. 37.

† Theophrastus (Hist. Plant. lib. III. cap. 10.) speaking of the fir, says, εἰς τα τῶν ζωγραφῶν πίνακα πικισι. And in another place (lib. V. cap. 8.) he says of the fir, that it is proper for painters' tablets, καὶ γὰρ πρὸς τὰς πίνακας τὰς γραφίμηναι.

larch,

larch,\* box-wood,† canvaſs,‡ white leather or parchment,|| or (ſometimes) on marble.§ When they employed wood, they laid on in the firſt inſtance a white ground.¶

\* *Larix femina* habet quam Græci vocant *Ægida mellei coloris*. Inventum eſt pictorum tabellis immortale nulliſque fiſſile rimis hoc lignum. Plin. XVI. 73.

† Learners began to draw upon box. Hujus (Pamphili) auctoritate effectum eſt Sicione primum, deinde et in tota Græcia, ut Pueri ingenui ante omnia Graphicen, hoc eſt picturam in *Buxo*, docerentur; recipereturque ars ea in primum gradum liberalium.

‡ Et noſtræ Ætatis Infaniam in picturâ non omittam. Nero princeps juſſerat coloffeum ſe pingi CXX. pedum in *linteo*, incognitum ad hoc tempus. Plin. XXXV. 33.

§ Ο γραφευς ουκ οφει οχον, &c. ſcriptor qui hoc ſibi proponit pulchrè ſcribere, iſ quia charta ſæpe tenuior ſit aut ſubula, aut quia atramentum minus ſit idoneum aberrat à ſcopo: ſimiliter etiam pictor ea ipſa perpetiatur, vel quia colores aut linteum (σινδων) in quo pingit minus ſit idoneum. Joannes Grammat. in Ariſt. lib. II. Nat. auſcultat. Junius, p. 170.

|| Alia multa Graphidis veſtigia extant in tabulis ac membranis ejus, ex quibus, &c. Plin. XXXV. 35.

In primis quidem pictorum, et potiſſimum quando in albis *Coriis* pingunt. Galen de uſu partium hum. lib. X. cap. 3.

§ Among the antiquities of Herculaneum are four pieces on white marble. Winckleman Hiſt. de l'Art. tom. II. p. 83.

¶ Winckleman Hiſt. de l'Art. tom. II. p. 109.

Their

Their immoveable paintings upon walls, ceilings, &c. were either in fresque, or upon the dry stucco in distemper. Indeed all the ancient paintings may be reduced to, *first*, fresque painting (*udo illini, udo testorio pingere*): *secondly*, water colour or distemper painting on a dry ground (*siccio testorio pingere*): and, *thirdly*, encaustic painting (*ceris pingere—picturam inurere*).

The ancient fresque paintings appear to have been always on a white stucco ground,\* the colours inlaid very deep, and the drawing much more bold and free than any similar performance of modern art; and indeed apparently managed in a different way. The *modern* method is, having prepared as much of the stucco ground as will serve for one day's operation, the design on paper is applied to the wet stucco, and traced with pin holes; the paper is then rubbed over with charcoal dust, which passing through the pin holes, leaves the outline traced upon the *stuccoed wall*: this is afterwards cut in with a tool.

The outline of the ancient paintings on fresque however, were probably done at once, as appears from the depth of the incision, and the boldness and freedom of the design equal to the ease and spirit of a pencilled outline; and from their exhibiting no marks of the modern method of

\* What the Italians now term *intonacatura*.

fresque painting discoverable in the performances of Michael Angelo, Raphael and other later artists.\*

Painting in fresco has a decided advantage over oil painting in the brilliancy and permanence of the colours which are not nearly so liable to injury from exposure in this way as when mixt up with oil. Many of the ancient paintings lasted a very long time, and one of the earliest as well as finest among modern paintings, whereof the colours are still said to be very vivid, is in fresco.†

In general however, the ancients painted on a dry ground, even in their buildings, as appears from the Herculanean antiquities, whereof most of the paintings are thus done. At Rome and Naples the first (deepest) coat is of Terra Puzzolana‡ about one finger thick:§ the next of ground marble or alabaster, and sometimes of pure lime (or stucco) in thickness about one third of the former. Upon this they appear to have laid a coat of black, and then another of

\* Winckleman Hist. de l'Art. tom. II. p. 107. et seq.

† The battle of Constantine and Maxentius, designed by Raphael and painted by Julio Romano. There are about a dozen ancient fresque paintings at Rome, of which the marriage in the Aldrobandine palace is one.

‡ Of the same nature nearly with the *terras* now used in mortar required to keep out wet.

§ Winckleman Hist. de l'Art. tom. II. p. 107.

red paint, on which last the subject itself was executed, as appears from those performances where the figures are worn out. Such seems to have been their general method of painting upon *walls*, at least in that period of the art, when the paintings were executed which now remain. In their moveable pictures and in the performances of their first artists, and where effect of light and shade was necessary, they doubtless used white.\*

The colours employed, they seem to have mixed up for use with size, of which they preferred that made by boiling the ears† and genitals of bulls. This appears to have made the colours so durable and adhesive, that the ancient paintings lately found bear washing even yet with a soft cloth and water, and sometimes even diluted aqua

\* *Angulare quod vocant candidum est quo muliebres picturæ illuminantur. ----- Ex omnibus coloribus cretulam (a kind of white chalk) amant uoque illini recusant purpurissum, indicum, cæruleum melinum auripigmentum, appianum, cerussa. Plin. XXXV. 30 and 31.* This passage implies that the colours thus enumerated were not decomposed when used on *cretula* as the ground.

† *Glutinum præstantissimum fit ex auribus taurorum et genitalibus. Nec quidquam efficacius prodest ambustis: sed adulteratur nihil æquè quibusvis pellibus inveteratis, calceamentisque etiam decoctis. Rhodiaceum fidelissimum; eoque pictores et medici utuntur. Id quoque, quo candidius eo probatius; nigrum et lignosum damnatur. Plin. XXVIII: 71.*

fortis



fortis is employed to clean the fresque paintings.\* Pliny some where says that glue dissolved in vinegar is not again soluble in water if left to dry, but I have lost my reference to the passage.

What the *encaustic* painting of the ancients was, has been much litigated. The Count de Caylus however, seems in part to have succeeded in explaining the passages relating to it, by adopting the most obvious meaning of them; and the paintings executed by himself,† Bachelier, Muntz, Zombo, &c. are no mean proofs that he was right in his conjectures.

The chief observations relating to *encaustic* painting in the works of the ancients, are the following from Vitruvius and Pliny.

*At si quis subtilior fuerit, et voluerit expolitionem miniaceam suum colorem retinere, cum paries expolitur et aridus fuerit, tunc ceram punicam igni liquefactam paulo oleo temperatam seta inducat. Deinde postea*

\* Winckleman, tom. II.

† Count Caylus exhibited a head of Minerva, painted in conformity to his theory of the *encaustic* painting, at the Louvre in 1754. Bachelier, who wrote *De l'Histoire et du Secret de la Peinture en Cire*, had executed a painting in wax in 1749. See on the subject of *Encaustic* painting *Memoires de l'Academie des Inscriptions*. XXIII. 328. XXV. 173, 187, 225. The Papers of the Abbé Mazeas, and of Dr. Parsons, in the *Phil. Trans.* XLIX. 652, 655. and LI. 40 and 53. Muntz's *Treatise on Encaustic Painting*, and his *Encaustic Eloge* of Count Caylus in *Mem. de l'Acad. des Inscip.* XXXIV.

*carbonibus*

*carbonibus in ferreo vase compositis eam ceram apprimere cum pariete calefaciendo sudare cogat, fiatque ut peræquatur. Postea cum candela linteis puris subigat uti signa marmorea nuda curantur. Hec autem novæ græcè dicitur. Ita obstant ceræ punice lorica non patitur nec lunæ splendorem nec solis radios lambendo eripere ex his politionibus colorem. Vitruvius.\**

In the following passage Pliny seems to have copied Vitruvius. *Solis atque lunæ contactus inimicus. Remedium, ut parieti seccato cera punice cum oleo liquefacta, candens setis inducatur: iterumque admotis galle carbonibus aduratur ad sudorem usque: postea candolis subigatur, ac deinde linteis puris sicut et marmora nitescunt.†*

*Ceris pingere et picturam inurere qui primus excogitaverat non constat. Quidam Aristidis Inventum putant, postea consummatam à Praxitele. Sed aliquantè vetustiores encausticæ picturæ extitère ut Polygnoti et Nicanoris et Arcesilai Pariorum. Lysippus quoque Æginæ picturæ suæ inscripsit ενκαυστην, quod profecto non fecisset, nisi encausticâ inventâ.‡*

*Pamphilus quoque Apellis præceptor non pinxisse tantum encausta, sed etiam docuisse traditur Pausan Sicyonium primum in hoc genere nobilem.¶*

*Encausto pingendi duo fuisse antiquitus genera constat, cerâ, et in ebore cestro, id est viriculo; donec classes pingi capere. Hoc tertium adcessit resolutis in igni ceris*

\* Lib. VII. cap. 9.

† XXXIII. 40.

‡ XXXV. 39.

¶ XXXV. 40.

*penecillo utendi, quæ pitum in navibus nec sole nec sale ventisque corrumpitur.\**

From these extracts it appears evidently that the ancient encaustic painting was of three kinds:

First, Where a picture painted in the common way, was covered with a varnish, of wax melted, diluted with a little oil, and laid on warm with a brush.†

Secondly, Where the colours themselves were mixed up with melted wax, and the mixture used while warm: and

Thirdly, Where a painting was executed on ivory by means of the *cestrum* or *viriculum*.

This last method, in my opinion, is the only one of the three which involves any difficulty in it.

The *cestrum* or *viriculum* was in all probability some sharp instrument used to trace the design on the ivory; for the *penecillum* was our painting-brush or pencil: but how are the words *pingere*, and *encausto pingere*, applicable to this?

Supposing Pliny himself not to be mistaken in the application of the terms he uses, the only

\* XXXV. 41.

† Some of the paintings at Herculaneum are covered with a varnish which makes the paint scale off. In a room there, a table of white wax has been found, together with different colours.

By the indiscreet application of warmth to some of these paintings where the colours have been mixed with or been varnished over with wax, the design itself has disappeared: this happened to some at Resina near Herculaneum.

possible

possible method appears to me to be this. With the cestrum (or viriculum) the design was traced pretty deeply in the ivory itself, something like the outline of the ancient fresque: the colours mixed up with wax, were used so warm as to permit them to enter into and fill up the scratches or incisions made with the viriculum, and the superfluous colour thus mixed up with wax, when cold and hard was taken off, leaving the surface of the painting even with that of the ivory.—This method would hardly need any subsequent varnish.

Pere Harduin, Boulenger, and Durand\* suppose the cestrum was used hot, and the design thus burnt in: but I do not see the necessity for this supposition. Dr. Parsons, thinks that as *cera* in the singular, is used where modelling in wax is intended, and *ceræ* in the plural, where encaustic painting is spoken of, the latter must mean something different from the former, and from the properties ascribed to this method he conjectures it was *enamelling*. But I can easily conceive the propriety of the singular number in the first case, where one uniform substance was employed, and the plural in the second, when there must of course have been many different preparations of wax, according to the colours mixed up with it. The method of Count Cay-

\* Vid. Dr. Parsons' Paper, Phil. Transf. vol. XLIX. p. 655.

lus is briefly this. Rub the canvass over with wax: then hold it near a fire that the cloth may imbibe the wax when it melts; when cool, rub it over with whitening that the water colours may adhere, and when the subject is painted, hold it near a fire that the colours may be imbibed.

Some experiments on this method by Mr. Colebrook may be found in *Phil. Trans.* vol. LI. and more particular directions in Muntz's *Treatise on Encaustic Painting*.

Such appear to have been the various methods of painting among the ancients, who, though ignorant of the modern method of mixing up colours with oil, seem to have attained a brilliancy and a permanence of colouring unknown among the oil paintings of modern art.\*

I forbear to enter at present into an account of the particular pigments employed by them, refer-

\* *La maniere de peindre pratiqué par les anciens étoit plus propre à parvenir au plus grand degré de vie et de la véritable carnation. Car outre que toutes les couleurs à l'huile perdent à la longue, c'est à dire qu'elles s'obscurcissent avec le temps, cette espece de peinture est toujours au dessus de la vie. Winckleman. Hist. de l'Art. II. 112.*

It appears from Muntz's experiments that water colours were far more bright when fixed by wax, than oil colours. *On Encaustic Painting*, p. 22.

In a room at *Resina* the cinnabar was so beautiful as to resemble purple.

ving that for the subject of the subsequent part of this essay. It only remains now to notice some other *miscellaneous* particulars not immediately reducible to the general divisions already discussed.

The honourable rank assigned by the ancients to the art of painting, and the numerous authors among them on the subject, I have already noticed.

The ancients not only had *connoisseurs* in the art of painting among those who were not painters by profession, as is evident from the whole tenor of Pliny's language, in particular, as well as from the other quotations herein adduced; but they appear also to have been sensible of the value of the first thoughts of their eminent painters, and like us to have treasured up *studies*, the rough draughts, sketches and unfinished performances of their great artists, *Alia multa graphidis vestigia* (says Pliny speaking of Parrhasius) *extant in tabulis et membranis ejus ex quibus proficere dicuntur Artifices.*\* And again, *Illud verò perquam rarum et memoriâ dignum etiam suprema opera artificum, imperfectas tabulas, sicut Iri Aristidis, Tyndaridas, Nicomachi, Medeam Timomachi, et quam diximus venerem Apellis in majori admiratione esse quam perfecta, Quippe in iis lineamenta reliqua, ipsæque cogitationes artificum spectantur, atque in lenocinio commendationis dolor est manus cum id agerent extinctæ desiderantur.*†

\* XXXV. 35.

† XXXY. 40.

These

These sketches and outlines were executed upon dressed skins (*coriis et membranis*—probably a kind of parchment) and also upon wood, particularly box wood, upon which scholars were taught in the first instance. *Et hujus (Pamphili) auctoritate effectum est Sicyone primum, deinde in totâ Græcia ut pueri ingenui ante omnia graphicen, hoc est picturam in buxo, docerentur; recipereturque ars ea in primum gradum liberalium. Semper quidem bonos ei fuit ut ingenui exercerent, mox ut honesti: perpetuo interdicto ne Servitia docerentur.\** Hence it appears that drawing was considered in Greece as an indispensable part of the education of youth in every family of respectable situation. A circumstance of itself sufficient to confer a decided superiority upon the country which thus encouraged it.

From hence perhaps we may also account for so many female artists being celebrated among the ancients. Pliny mentions seven, in his enumeration of eminent painters.† The history of the art in modern times will add but few to the names of Maria Cosway and Angelica Kauffman.

Among the modern painters of eminence, we hardly know of any except Michael Angelo who have cultivated the sister arts of modelling and sculpture. Among the ancients, it seems to have

\* Pliny XXXV. 35.

† XXXV. 40.

been common for painters to attend to these, and also for sculptors of the first reputation to practise painting. Thus Phidias\* was originally a painter: Callimachus† was a painter: Praxiteles and Lyfippus‡ are mentioned among the inventors of encaustic painting.—All these were statuaries of the very first eminence.

Euphranor modelled and made figures of porcelain; he was a sculptor also on marble: || Protopogenes cast in brass: § so did Eutiches: ¶ Polygnatus, Lesbocles, Prodorus and Pythodorus who were painters of note (particularly the first) did the same; they appear also to have practised embossing upon silver\*\* (*calatura*.) From this fashionable degree of general attention, in all probability, arose that diffusion, among the ancient artists, of ease and correctness of design so frequent in their remaining performances, and so

\* XXXV. 34.

† XXXIV. 19.

‡ XXXV. 39. It is not indeed quite certain whether these were the same persons so famous as sculptors, but from the similarity of name and the commonness of the circumstance, it is highly probable.

|| Plin. XXXV. 40. § XXXIV. 19. and XXXV. 35.

¶ XXXV. 40.

\*\* XXXIV. 19.

conspicuous



conspicuous in their expression of the human figure in particular. \*

Such are the principal facts and observations which I have been able to collect concerning the state of painting among the ancients. I have found it impossible to avoid crowding the page with a multiplicity of quotations and references, consistently with my design of collecting, in a small compass, all the material facts upon the subject, and advancing none but in conjunction with the authority upon which it rests. Perhaps the society will deem the utility sufficient to compensate for the apparent pedantry of the method I have adopted, more especially as it will render it easy for others to correct the mistakes which I myself may have committed,

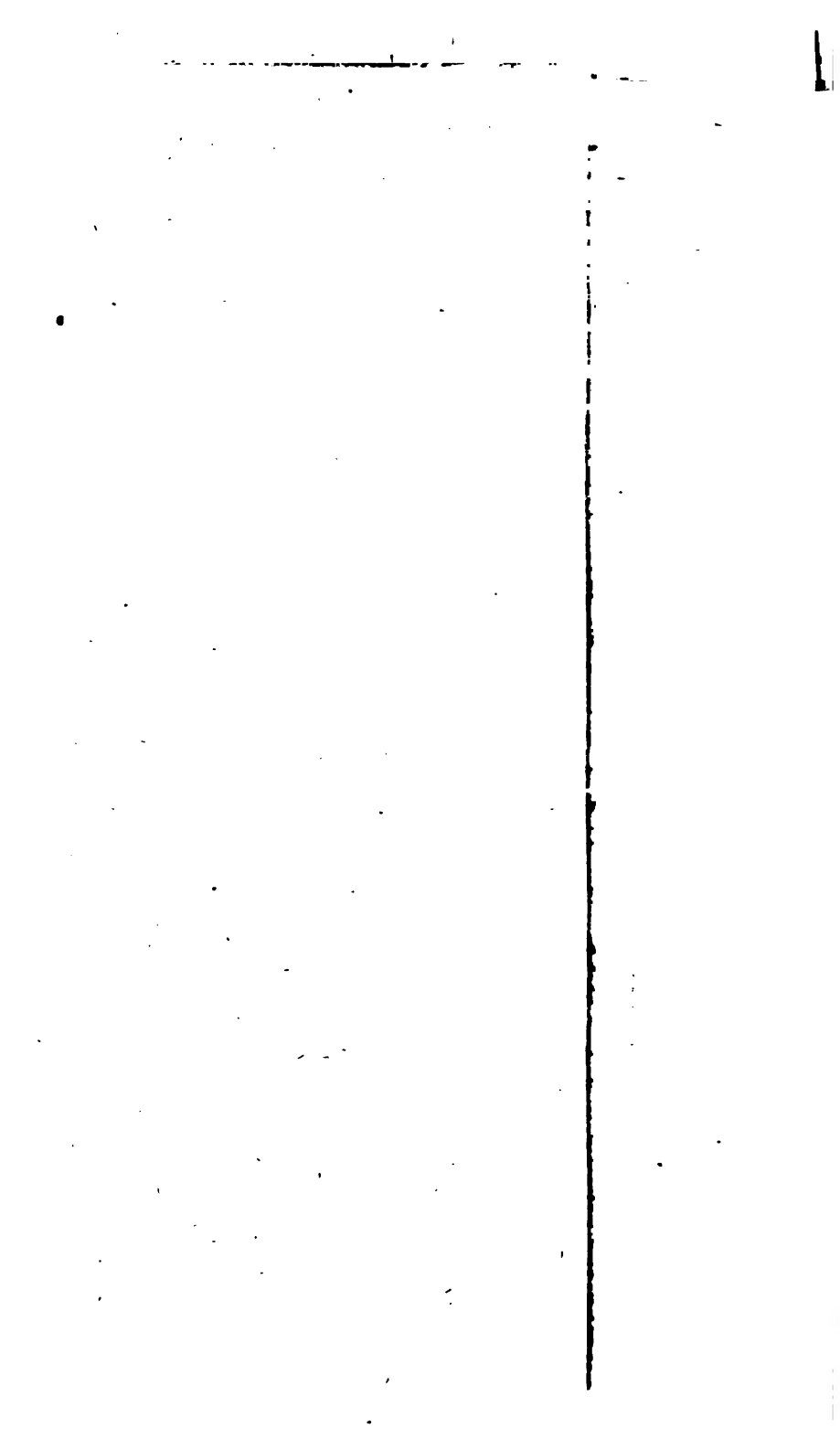
\* It seems from the preceding references to have been common among the ancient painters to attend to each branch of the imitative arts so elegantly noticed in the following passage of Apuleius: *Enim vero quod luto fictum vel ære infusum, vel lapide incisum, vel cerâ inustum, vel pigmento illitum, vel alio quopiam humano artificio adsimulatum Cadaveris ritu, unum vultum et immobilem expreffit. Apologia.*

*Some ACCOUNT of a MINE in which the AERATED  
BARYTES is found; by Mr. JAMES WATT, jun.*

READ NOVEMBER 30, 1789

**T**HE late successful and important application of the Muriated Barytes, in scrophulous cases, by Dr. Crawford, having much increased the demand for that Salt, it is become of consequence to humanity that the means of procuring its basis, the Ponderous or Barytical Earth, should be facilitated, and its scarcity diminished. The method commonly employed, of obtaining it from the Vitriolated Barytes, by treating this latter with mild alkali, or charcoal, is troublesome and expensive, whereas the Aerated Barytes presents us with it naturally in such a state, that it may immediately be used for solutions in acids, without any previous preparation whatever; it is therefore much to be desired that the sources from whence a plentiful supply of this lately discovered Fossil may be obtained, should be made known to the public, from whom its native places have hitherto been kept a secret, and specimens of it been sold rather  
for





for curiosity, than for use. Instigated by this motive, and at the desire of my friend Mr. Cooper, I have undertaken to lay before the Society an account of the only mine in England\* in which, according to the best of my information, any Aerated Barytes has been discovered. At the same time I shall submit the few observations which two short visits have enabled me to make upon the natural history of a fossil, concerning which the curiosity of Mineralogists has been excited, but never gratified.

The first intimation of the Aerated Barytes existing naturally, was given by Dr. Withering, who published an excellent analysis of it in the Philosophical Transactions, for the year 1784, wherein he has left us little to desire respecting its chemical properties. However he was misinformed as to the place from whence his specimen came, which he supposed to be Alston Moor, where I have good authority for advancing, that none has been found. He has since informed me that he believes it came from the same mine of Anglezark, which forms the subject of the present paper.

\* In Scotland it has been found in the mines of Strontain and Dunglass, near Dumbarton, but I have not heard of its being yet discovered on the Continent. A Fossil sent from Scotland to Dr. Crawford, as the Aerated Barytes, and not very dissimilar in its external appearance, seems from his experiments to contain a perfectly *New Earth*.

The Mine of Anglezark lies within a district of the same name, situated on the property of Sir Frank Standish, Bart. about three miles to the east of Chorley, in this county. The country is hilly and of a stratified or secondary nature, consisting of alternate strata of Sand-stone and Argillaceous Shiftus, interlaid here and there with thin beds of Coal. The Valley, which is traversed by the principal Veins, runs in an easterly direction; the hills on both sides of it are low, though of steep ascent. I found the Strata upon the south side of it, in the Shaft called the New Engine Shaft, to follow one upon another in the following order and thickness.

- $\frac{1}{2}$  yard loose Stones and Sand.
- $7\frac{1}{2}$  yards Sand-stone.
- $\frac{1}{2}$  yard Argillaceous Shiftus and Coal,
- 1 yard Argillaceous Shiftus.
- 16 yards Sand-stone.
- $16\frac{1}{2}$  yards Argillaceous Shiftus.

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- 42 yards whole depth of the Shaft.

In the last stratum, in another part of the mine, an Under-ground Shaft has been sunk eleven yards deeper, in working which they cut through two or three small beds, about a foot in thickness, of an exceeding hard bluish Sand-stone.

The Sand-stone which forms the second and fifth strata, consists of small angular particles of Quartz, interspersed with others of Mica, and agglutinated by

by an argillaceous cement, so as to form a very hard aggregate of a reddish grey colour.\*

The Argillaceous Shiftus, which is called *Shiver* by the miners, differs little from that which is in general found incumbent upon Coal.† It appeared to contain no marine exuviae, but abundance of thin laminæ of Martial Pyrites between its plates; at least this was the case with those pieces which were found near the vein.

The Strata dip from East to West, with a general declivity of about five inches in two yards. Those on the North side of the veins, or towards the valley, lie six yards deeper than the corresponding ones on the South.

\* I have no doubt that these Strata of Sand-stone, as well as many others of the same nature, originate from Granite Mountains, which in some of the great revolutions of the globe, were in part destroyed, or wasted by the violence of the waters, forced along with the irresistible torrents, and by them conveyed to, and deposited in the beds where we now find them, where they afterwards consolidated. I am led to this conjecture, not merely from the general method of accounting for the formation of Stratified or Secondary Mountains, but more especially from having observed in these Sand-stones all the component parts of Granite, Quarz, Mica and Felspar, the last of which in general forms the cement, though distinct crystals of it are also interspersed in the mass.

† Vide Forster's Introduction to Mineralogy, Shiftus friabilis, p. 14; also Berkenhout's Natural History of Great Britain, part III. p. 14. It is omitted in Kirwan's Mineralogy, as also in Magellan's Cronstedt.

The

The Mine consists of several Veins intersecting these strata, nearly perpendicularly and running in various directions, as represented in the annexed Plan.\* Most of the veins appear to have their beginning† in the Chorley Road Vein which crosses the valley at its entrance, from whence they run eastward into the slopes of the adjacent hills. The Old or Sun Vein, which is the principal one, runs for the most part in degree twenty-one of the miner's compass, which is a small deviation from due east. It is in general from six inches to three feet in thickness, and does not fall quite perpendicular, but inclines or dips a very little to the North, till it arrives at the bottom of the second stratum of sand-stone, when its inclination becomes of a sudden much more considerable, in so much that in the sixteen and a half yards to the bottom of the shaft, it is thrown five yards out of the perpendicular. The same happens to the Engine

\* I received this plan as also much of my other information from the overlooker of the mine, an intelligent miner. It is exact as far as my observation goes, at least sufficiently so, to give a general idea of the direction of the veins and their situation with regard to the adjacent valley.

† A quantity of stagnant water lying in the Chorley road vein, prevented me from examining whether these veins were continued to the west of it, but the overlooker assured me they were totally cut off by it, which is no uncommon case. Vide. *Von Oppel's Bericht von Bergbau*, § XXXVI. p. 10.

and



and Mine-house Veins which join it in its progress to the East and are nearly of the same thickness. From the Mine-house Vein proceeds a small one called the String Vein, which runs parallel to the Sun Vein. To the North of all these lies the New Trial Vein, which apparently has also its rise in the above-mentioned Chorley road vein and runs in the direction shewn in the plan, which seems to indicate that it likewise at some distance falls into the Sun Vein; it is nearly of the same dimensions as the others, but has not been hitherto much worked upon, owing to its lying low, and its being difficult to carry off the water.

The Matrix of the veins is Aerated and Vitriolated Barytes. The former is found in the greatest quantities next the surface, where it is almost entirely free from any mixture of the latter, but becomes more and more contaminated with it in proportion as the depth increases, until in the lowermost strata it is scarcely to be met with at all, the vitriolated having usurped its place. There is an evident transition from the Aerated to the Vitriolated Barytes which may distinctly be observed through its different stages or gradations, in all parts of the mine. Small quantities of Calcareous Spar are also found in the lower part of the Sun Vein.

The Ores are, the common Galena or Blue Lead Ore, plentifully attended with its usual satellites, Blende or Black Jack, and Martial Pyrites.

The

The Aerated Barytes near the surface does not contain much Lead Ore, but when it is found in the second stratum of Sand-stone, it forms the richest part of the mine. In the immediately following stratum of Shiver, it becomes more scarce, and indeed its presence there is not looked upon as a good omen, as it then contains large quantities of Blende and Pyrites and but little Lead Ore. But whatever the Matrix be, it is a general observation that the vein is richer in passing through the strata of Sand-stone, than through those of Shiver.

The Ore is sometimes found in the form of a regular vein, but more commonly in irregular nodules or clusters, disseminated throughout the matrix. Where the vein is very thick, the greatest part of it is usually filled up with detached pieces of Sand-stone and Shiver, which is more particularly the case where one vein runs into another. In sinking the Under-ground Shaft which I mentioned before, the quantity of ore decreased in proportion to the depth, until at the depth of ten yards they entirely lost it, the vein still continuing of the same thickness. The matrix was loose vitriolated Barytes. They were endeavouring to regain the Ore and had applied a small pump, worked by a water wheel in the valley above, to raise the water to the level, called *South Level*, which carries off all those of the mine.

It appears from the best of my information that this Mine was first worked about a century ago; it

was

was then left standing during a period of sixty years until the year 1781, since which it has been regularly worked.\*

As the greatest quantities of the Aerated Barytes lie near the surface, they were probably gained during the very first period of working the mine, it being usual here to take the uppermost part of the vein first, and clear all before them as they go deeper. But as that fossil, was never supposed to be of any use, or to possess any intrinsic value; in all probability it has not been removed from the spot, and great quantities of it must be contained in the old heaps of stones and rubbish thrown out of the mine. Much of it may also be had from the old works, or what is called *the Old Man*, in the interior of the mine, having been placed there with other stones and wood to prevent the sides from falling in, after the vein had been worked out. Another source from which it will probably soon be obtained in large quantities is the

\* To give some idea of the small extent of it, it will only be necessary to mention, that during the first five years of this latter period they did not raise above four ton of lead per annum, and that in the three last, they have raised in all only seventy-three ton, which difference seems to have been occasioned by the driving of the South Level, at the depth of forty-two yards from the top of the New Engine Shaft, for the purpose of clearing the mine of its water, which before was raised to the surface with much difficulty by a water wheel. The number of Men employed now is from ten to sixteen.

New

New Trial vein, which has hitherto been little worked upon, but where an essay is now intended to be made. The quantity of it gained in that part of the Sun Vein, where they are now at work is very inconsiderable.

I purposely avoid entering into a more minute detail of the various parts of the Mine, of the method of working the Vein, or of such other circumstances as might appear neither peculiar nor interesting, and shall close this account with a description of the *External Characters* of the Aerated Barytes; as well for the information of mineralogists, who have not had an opportunity of seeing it under so many different circumstances, as for the instruction of those, whose business requires that they should have a sufficient knowledge of it, not to confound it with other fossils.\*

The

\* In a late advertisement for the sale of the *Muriated Terra Ponderosa*, it is asserted, that the mineral from which that Salt is obtained, (meaning the Aerated Barytes) frequently contains a quantity of Arsenic and Lead. If by the word "contains" be meant a *Chemical* combination of these poisonous metals, there is not sufficient ground for the assertion; since the Mineral, such as I have described it, contains according to the best analyses, nothing but Terra Ponderosa, Fixed Air and sometimes a small adventitious quantity of Vitriolated Barytes. I have indeed observed that what has lain a long time in the Old Works in the interior of the mine, becomes penetrated with ochreous water, which insinuating itself between the fasciculi, gives a yellowish tinge to the whole. The Aerated Barytes thus containing Iron, when exposed to heat becomes green, a circumstance which Fourcroy in a paper on that fossil, in the  
fourth

The Aerated Barytes is in general of a pale greyish white colour, but sometimes it inclines to the milk white, and at others has a slight yellowish tinge, which is a token of the presence of Iron.

It is found in solid masses, sometimes filling the whole of the vein, at others interspersed amongst the Vitriolated Barytes; the masses are generally rounded on the outside, and affect something of a globular form. It is seldom found externally crystallized: I have however observed four varieties of it in that state. The one in which a number of small Crystals radiated in the form of a star from a centre; these Crystals were about half an inch in length, very thin, and appeared to be hexagonal columns rounded to a point. The other varieties were the six-sided column, pointed

fourth volume of the *Annales de Chimie*, attributes without any sufficient grounds, to the disengagement of fixed air. If on the contrary, "contains" be intended to denote a *Mechanical* mixture, or adhesion of the Arsenic and Lead to the Aerated Barytes, I apprehend this also to be a mistake, as among all the specimens which I have seen, I have never yet been able to detect Arsenic under any form whatever. I imagine the Martial Pyrites has been mistaken for Mispickel; but the Arsenical part of Mispickel not being soluble in the marine acid, can be of no prejudice in preparing the Muriated Salt, and it is hardly possible to confound either it, or Blue Lead Ore with Aerated Barytes.

I have thought it necessary to make the above remarks, that the idea of so simple a medicine being liable to contain such poisonous metals, might not render medical men unnecessarily scrupulous in prescribing, or deter patients from taking it.

with

with a pyramid of the same number of faces ; also the double six-sided, and the double four-sided pyramid.

It has a strong Gloss or Lustre upon the recent fracture.

Its Fracture, in one direction, is striated or radiated, composed of small convergent fasciculi ; when broken transversely it assumes a kind of glassy or chonchoidal fracture, like Quartz. When externally crystallized, its Fracture does not appear radiated in any sense.

It splits into irregular, rather longish Fragments.

The large masses are frequently composed of globular concentrical pieces, several of them lying one on the outside of another, and having a roundish one in the centre, to which the radii or fasciculi of the rest are pointed.

It is semi-transparent, or diaphanous ; just soft enough to admit of being scraped by a knife. Is brittle, and heavy, but in a somewhat less degree than the Vitriolated Barytes. Its specific gravity has been found to be from 4.300. to 4.338.

Perhaps to some, after the censure which that excellent chemist Mr. Kirwan has lately passed on the utility of external descriptions of fossils, this delineation of those characters, by which, without having recourse to the more tedious chemical ones, the Aerated Barytes can invariably be distinguished from all other fossils, may appear superfluous. But many eminent mineralogists still differ in opinion

nion from that gentleman, both with regard to the sufficiency, certainty and utility of these characters; and I hope soon to see the grounds of their dissent clearly stated and sufficiently established.

However before such descriptions can be carried to that degree of perfection, to which the acute observations and accurate distinctions of a *Werner*, have raised them amongst the Germans, it will be necessary both to adopt new words into our language, and to fix more precisely and mineralogically the meaning of those we have already.

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*On the EFFECTS produced by DIFFERENT COMBINATIONS of the Terra Ponderosa given to Animals; by Mr. JAMES WATT, jun.*

READ NOVEMBER 13, 1789.

AT the Time of writing the foregoing Paper, I consulted Dr. Leigh's *Natural History of Lancashire, Cheshire, &c.* in hopes of meeting with something illustrative of the Antiquity of the Mine of Anglezark, and, though deceived in my expectations in that respect, I was much struck with a curious passage, which seemed to point out some remarkable properties of the Aerated Barytes unnoticed by later Writers. It is as follows.

VOL. III.

R r

“ There

“ There are different kinds of Spars ; as to  
“ their internal qualities, some, if taken inwardly,  
“ will vomit and purge most violently, as that  
“ in the Lead Mines near Andlesack, in Lanca-  
“ shire ; and this no doubt consists in great  
“ measure of Salt and Sulphur, which I take to  
“ be the reason that it is emetic. But the na-  
“ ture of this Spar will more fully be made out  
“ from the subsequent instances, and the first is  
“ by calcination, in which you easily discover  
“ that a pound of this will yield a drachm of *Arsenic*  
“ at the least, lying between the lamellæ of the  
“ Spar. Whence therefore this comes to be of so  
“ poisonous a nature is plainly evident ; notwith-  
“ standing this, the neighbours thereabout will  
“ frequently take a scruple at least of this in fits of  
“ the *stone*, in whom it vomits, purges and works  
“ violently by Urine ; in this case as they have  
“ frequently assured me they have found great  
“ relief ; whence the vomiting and purging  
“ proceed is evident as we have before observed,  
“ viz. from the Arsenical Sulphur ; as likewise  
“ from that profuse quantity of Urine, which  
“ may sufficiently hint to us what kind of mor-  
“ bific matter it is that causes the Diabetes,  
“ both in the quickness of its poisonous quality,  
“ and likewise the sweetness of the Urine.  
“ There are some who have ventured to be so  
“ daring as to take a drachm of this, particularly  
“ one James Barns’s wife and child, but, alas ! to  
“ their



“ their woful experience they found the sad  
“ effects of it, for in about nine hours afterwards  
“ they both expired. The like quantity of this  
“ in about three hours time will kill a dog ;  
“ and it is observable that the dog while living  
“ is deeply lethargic, which may farther illuf-  
“ trate to us, in malignant *Fevers* attended with  
“ those Symptoms, what kind of matter proba-  
“ bly it is that causes those Symptoms ; but that  
“ is more fully discussed in its proper place.  
“ Nay so spreading is the poison of this Spar,  
“ that it has not only been fatal to the creature  
“ that has taken it, but a dog, by licking the  
“ blood of a Swine which had taken it acciden-  
“ tally mixed with meal and butter, expired  
“ likewise ; and it is farther observable, that  
“ the flesh of the Swine was afterwards eaten,  
“ and did no mischief though the blood was  
“ poisonous ; because, as we may reasonably  
“ conjecture, the Arsenic had not spread itself  
“ farther than the mass of the blood.”\*

Upon reading this passage, I recollected hav-  
ing been told, by the Miners at Anglezark, that  
they used the Aerated Barytes in the neighbour-  
hood to destroy Rats, I therefore had little doubt  
that this must be the Spar above alluded to.  
And though some of its effects appeared to be  
exaggerated and the method of accounting for

\* Page 76.

them erroneous, yet the subject seemed well worthy of a nearer investigation. For as Poisons, when properly administered, are generally esteemed the most efficacious remedies, and as combinations of the Terra Ponderosa had already been exhibited, it appeared desirable to trace, upon inferior animals, the effects of a substance which promised to be of importance to the health of mankind; at any rate, it was adding one fact more to our knowledge, to become thus acquainted with its pernicious effects. To this purpose I instituted the following experiments.

EXPERIMENT I. At four o'clock in the afternoon I gave a Terrier bitch, weighing about thirteen pounds, which had been without food that day, one drachm of Aerated Barytes, finely pounded and strewed upon some broiled beef, to induce her to take it. The first half hour it did not appear to produce any effect. At five o'clock she began to froth at the mouth and to be slightly convulsed; she drank a little water, but appeared very lethargic. Between five and six o'clock she was violently purged, and vomited a quantity of whitish curdled matter, after which she became extremely weak and languid; she still continued to froth at the mouth, and refused water, though without any signs of aversion. From six to seven o'clock, her debility kept gradually increasing, until a complete Paralysis took place: she lay extended, entirely deprived of the command of  
her

her limbs and even incapable of removing her head from one position to another, so absolutely was all muscular power relaxed, that upon taking hold of the loose skin of her neck and afterwards relinquishing the grasp, it retained the position into which it had been forced; her eyes however were still moveable, her breathing was tolerably easy, and she did not give any signs of acute pain. From seven to eight o'clock, the same Symptoms continued, without any other alteration than that of her breath becoming more short and convulsive. The convulsions became stronger between eight and nine, and she gave evident tokens of pain. At half past nine o'clock the Convulsions and Symptoms of pain had almost ceased, and the lethargic stupor was considerably increased. At ten o'clock I left her, her eyes were then sunk and half-closed; she was totally deprived of sensation and of motion, except that excited by her fetching breath, so that her approaching dissolution appeared evident. The next morning she was found dead.

On Dissection, both the Ventricles and Auricles of the heart were found filled and distended with black grumous blood; the stomach empty, but apparently much inflamed; the bladder empty and perfectly collapsed; the other intestines in their usual state, and the brain also perfectly sound.

Exp. II. At fifteen minutes after twelve, I gave a Puppy, weighing nine pounds, forty grains

of finely pounded Aerated Barytes strewed upon bacon. During the first half hour no visible effects were produced, but a few minutes afterwards an incipient languor was distinctly observable, yet accompanied with a degree of restlessness and seeming anxiety, which continued till about two o'clock, when he vomited the whole of what had been given him, and was violently purged. From that time till six o'clock he appeared extremely anxious and restless, without giving any symptoms of acute pain and without becoming at all paralytic. He was found dead early the next morning. Upon opening the carcase, the Stomach was found replete and distended with a large quantity of Straw, which the animal had probably eaten to relieve the uneasiness he felt. The other appearances were quite natural, except that one lobe of the lungs was a little inflamed, which might be adventitious.

Mr. Thomas Henry, junior, repeated the first experiment and found similar effects produced; the Stomach and the whole intestinal canal were much inflamed in his subject; the inner coat of the Stomach, particularly about the pylorus, was of a deep livid colour.

These experiments having appeared sufficient to prove the strong operation of the Aerated Barytes on the Animal Economy, I was desirous of knowing the relative effects produced by those combinations of the Terra Ponderosa which had  
already

already been exhibited, and with this view instituted the following experiments.

**Exp. III.** I gave a Dog weighing twenty pounds, thirty grains of crystallized Muriated Barytes, with bacon. He appeared very uneasy immediately after taking it, and, though before extremely hungry, refused meat. In about twenty minutes, he began to froth at the mouth, and in ten more he vomited a little, after which he drank freely of water; he was purged and remained extremely sick and uneasy till about an hour after he had taken it, when he threw up the whole, but did not get the better of his sickness and uneasiness, for near twelve hours afterwards.

**Exp. IV.** After an intermission of a week, I gave the same dog one drachm of the crystallized Muriated Barytes as above; he grew sick in a quarter of an hour and threw up the whole in twenty minutes, after which he was violently purged. He continued ill for about four hours, when he again recovered his appetite and the next day was perfectly well.

**Exp. V.** I administered fifteen grains of the crystallized Nitrated Barytes to a Puppy weighing nine pounds. It did not bring on any sickness till about forty minutes after he had taken it, and he retained his appetite till then. In five minutes more it acted emetically and cathartically, after which he gradually recovered his vivacity, and was well in an hour's time.

Exp. VI. I attempted to give the same dog thirty grains of the Nitrated Salt, with some meat, but he refused to take it. I then dissolved that quantity in water and poured it down his throat, though not without spilling some of it. It produced an immediate frothing at the mouth, which was quickly followed by vomiting and sickness. However, he recovered in the course of three or four hours, and eat with great voracity.

An indispensable attention to business prevented my prosecuting these experiments any farther; they must therefore remain for those who have more time and leisure to bestow upon them should they be deemed worthy of a continuation. However, before I relinquished the subject I was desirous of knowing what effect would be produced by the simple Ponderous Earth. I still was of opinion, notwithstanding Dr. Withering's and Dr. Priestley's experiments, that the fixed air might be expelled from the Aerated Barytes by a strong heat alone, and sent some of it to Mr. Josiah Wedgewood, junior, requesting him to expose it to the greatest possible heat in one of his father's furnaces; he was so obliging as to comply and favoured me soon after with the following Account of his experiment.

“ I have exposed to a very strong heat for  
 “ thirty-six hours, two ounces of the Aerated  
 “ Barytes, but have not been able to weigh it  
 “ since, from an effect having taken place which  
 “ I did

“ I did not expect. Some part of the Barytes  
“ appears to have begun to vitrify with the  
“ matter of the cup in which it was exposed and  
“ has formed a greenish substance, which sticks  
“ pretty fast to the Vessel and in one place has  
“ corroded it so much as to have formed a small  
“ hole exactly in the way that Fluor does. As  
“ I was not very careful in picking the pieces  
“ I suppose the greenish colour to have been  
“ owing to some impurities.\* This experiment  
“ has however proved that a long continued heat  
“ does not expel the whole of the fixed air if it  
“ does any part of it, for the burnt Barytes  
“ immediately upon coming out of the oven  
“ effervesced strongly with the Marine Acid and  
“ dissolved exactly in the same manner as the  
“ crude. The heat it has undergone was  $110^{\circ}$ .  
“ of my Father’s Thermometer.”

Finding it was impossible to render the earth caustic by this process, I desired the above-mentioned Gentleman to make use of Dr. Withering’s method of dissolving it in the Marine Acid, precipitating by a mild Alkali, and expelling the fixed air by heat from the artificial Aerated Barytes thus formed. This was done and the earth rendered perfectly caustic,

\* The Specimens I sent Mr. Wedgewood were penetrated with ochreous water, therefore I should imagine the green colour to proceed from the Iron.

but

but before I received it, which was a couple of days, it had attracted so much fixed air from the Atmosphere as to be become perfectly mild, and it required a strong heat to render it again caustic.

Exp. VI. One drachm of this given to a Dog weighing about sixteen pounds, brought on a vomiting and purging in about a couple of hours, after which he was a little sick, but soon recovered and has been well ever since.

By these experiments, Dr. Leigh's Account of the general fact of the pernicious effects of Aerated Barytes is sufficiently proved; and it appears, that the Muriated and Nitrated Barytes may be given, to dogs, without any permanent injury, in much greater quantities than has been supposed. It also appears, that the Caustic Earth does not, by any means, produce such noxious effects as the Aerated; owing, perhaps, to the great quantity of fixed air which becomes disengaged, when the latter is dissolved in the Stomach by the gastric acid. How far the inference, from inferior animals, will hold with regard to mankind, must be left to better Physiologists to determine.



A N

A P P E N D I X

TO THE

INQUIRY CONCERNING THE

PRINCIPLES OF TAXATION;

CONSISTING OF SUPPLEMENTARY

NOTES AND ILLUSTRATIONS.

## ADVERTISEMENT.

*IN the following Notes the Author has not deemed it necessary to confine himself strictly to the subject of Taxation; but has touched upon various other topics, relative to political œconomy, and to the foundation of civil government. As these are intimately connected with, and illustrate each other, he trusts the reader will excuse the latitude he has taken, in this Appendix; which is inserted at the end of the present volume, rather than at the close of his Dissertation, on account of the length to which it has been extended.*

APRIL 1, 1789.

# AN APPENDIX

## TO THE INQUIRY CONCERNING THE PRINCIPLES OF TAXATION, CONTAINING SUPPLEMENTARY NOTES AND ILLUSTRATIONS.

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Note (A) page 5.

PROPERTY NOT THE MERE CREATURE OF CIVIL SOCIETY.

**A** LEARNED friend, of distinguished rank both in the church and in the republic of letters, to whom I communicated the Inquiry concerning the Principles of Taxation, "regards property " as very much the creature of civil society, and the supreme " magistrate as authorized to apply the whole of the property of " every individual, to the use of the whole community."\*

Notwithstanding the deference and respect I feel for the decision of one, whom I know to be a very able judge of the subject of legislation; yet I am strongly inclined to controvert the doctrine advanced, which by *leaving nothing that a man may call his own*, (to adopt the expression of Lord Clarendon), seems to subvert the interest we have in Society itself.

I. A desire of possession, and tenaciousness of what is attained are manifested in the earliest stages of life. They are modifications of one and the same principle, which grows with our growth, is independent of society, and subsists in as full force among savages as in the most cultivated nations. The like principle is common even to the brutes. The beast of prey

\* A similar opinion is advanced by Puffendorf.

asserts

asserts an exclusive right to his den, and to the provisions he has stored for himself, or for his offspring. The cock drives every invader from his dunghil. And the rooks punish with severity the marauders, that come to pilfer their nests. But to enter into a discussion of the origin of property would exceed the limits of a note. Suffice it to observe, that we can clearly deduce it from the necessities, the desires, the affections, and other active energies of man. Of these energies, civil society is the *consequence* and not the *cause*; and its office is to regulate them, to augment their vigour, and to afford more complete security in whatever is acquired by them. If, therefore, the powers of his nature be man's exclusive right, every thing resulting from them must be equally appropriate. And the just claim of government extends only to an equivalent to the benefits enjoyed under it.

II. Justice, fidelity, and veracity imply, in their exercise, the social state: But their obligation is independent of, and presupposed by the political union; and constitutes its only rational and legitimate bond. Is property, more than those moral virtues, the creature of civil society? All of them may subsist without government: For if only two men dwelt together on a desert island in a state of perfect equality, each would have his appropriate rights of possession; and the claim to justice, fidelity, and veracity would be reciprocal.

III. The social union is a combination of numbers, for mutual assistance, comfort, improvement, and protection. If every individual concur in the public acts of such a community, at the first view, there might seem to be no violation of private rights. It should be remembered, however, that the circumstances and opinions of those individuals may vary in the lapse of time; and that the rights of posterity, also, are involved in their decisions. The present inhabitants of Denmark are now enslaved by the rash surrender of their liberties, which was made in 1660. Besides, the public acts of a community, if large, must necessarily be acts only of the majority: And a majority may, indeed frequently does, as the history of all nations evinces, commit violence on the rights of the minority.

Fanaticism

Fanaticism, like that which subsisted amongst the anabaptists of Munster, about two centuries ago, may induce the civil magistrate to order every man to bring forth his gold, silver, and precious effects, to be deposited in a public treasury, and to be dispensed, for common use. But this would be an act of power, not of justice or legitimate authority.

IV. Grants of money, in almost every country, are made on express conditions, and as voluntary sacrifices of private rights to public good.

\* Whenever the public good requires the involuntary sacrifice of the good of an individual, great attention is paid, in all just and moderate governments, to do as little violence as possible; and to make full recompense for the injury sustained. This seems to be an unequivocal acknowledgment of the existence of private property, in the strictest sense of the word.

V. As every man has a natural right to life, he must have the same natural right to the means of supporting life. On this principle, the Athenians seem to have considered that share of a man's property, which is necessary to his subsistence, as absolutely exempt from taxation. Thus a rent of five hundred measures of corn was assessed in the yearly contribution of a talent. A rent of three hundred paid half a talent. A rent of two hundred paid one sixth of a talent; and land of a lower produce paid no subsidies at all. In the early days of Rome, seven acres were the utmost extent of landed property, which a Roman citizen was allowed to hold. This portion was, probably, not more than adequate to the supply of a family.

VI. There is a species of acknowledged property appertaining to states, over which they exercise an exclusive power of disposal, which bears a close analogy to private possessions. It consists in crown-lands, public buildings, highways, fortifications, &c. Can public levies, to a considerable extent be, like this, regarded as the absolute right of the civil magistrate?

VII. But it may be urged, that the greatest part of property, whether personal or real, is enjoyed by *inheritance* under the

• *Dominium eminens* : Transcendental property,

authority of *laws*; and that the laws, being the creatures of civil society, render property itself equally so: The argument, however is a fallacy. Law does not constitute the right to property; but only recognizes, sanctions, and regulates the exercise of it. What a man has acquired by art or industry, without violation done to others, is at his absolute disposal; and may, if not applied to his own use, be given to his children, his relations, or friends. Nor can there be any definite time for the restriction of such transfer; and consequently it will have equal validity at the hour of death as in the prime of life, provided the donation be voluntary, and made with a sound mind. It has indeed been said, that in a state of nature, a man's right to a particular spot of ground arises from his using and wanting it, and consequently ceases with the use and want; so that at his death the estate reverts to the community, without any regard to the last owner's will.\* But this presupposes what is in itself a contradiction, that man in *community* is a *solitary* animal, labouring, and living only for himself: Whereas the truth is that he labours and lives more for his family and his dependants, than for himself; that his attachments to them stimulate his faculties and give energy to his exertions; and that to deprive him of the future end, he seeks in his acquisitions, is the same wrong in kind, and much greater in degree, because more injurious to his best and strongest feelings, that it would be to deprive him of the present use of them. A father may leave an infirm widow, and numerous helpless orphans; for whom he anxiously toiled, and toiled with success. Is it equitable that they should be cast on the public for support? If it be not, the law, which guarantees to them their father's possessions, only confirms, and does not institute their right, which is founded in nature, reason, and justice.

VIII. The dispute, perhaps, about the right of the supreme magistrate to the entire property of the whole community, is rather verbal than substantial. For, admitting it to subsist, it can only be exercised when rights of the whole community, still dearer than those of property, are in the most imminent hazard, such as life, liberty, and religion. There must then be a justify-

\* Paley's Moral Philosophy, vol. I. p. 222, 8vo.

ing plea for such exercise of power: And the ultimate decision, concerning this justifying plea, must rest with the people.

**Note (B) page 12.**

### INFLUENCE OF THE CROWN.

The resolution, that "the influence of the crown had increased, is increasing, and ought to be diminished," was moved by Mr. Dunning; who explained his meaning to be, not the influence of the virtues of the sovereign, or the just rights of his prerogative, but that which arose from corruption, and other undue practices.

Sir Fletcher Norton, the Speaker of the House, observed, "that it would be criminal in him to remain silent on this occasion. He declared, in the most direct terms, that the influence of the crown had been increasing of late to an alarming degree. No man had a higher veneration for monarchy than he had: He meant that species of it established in this country; a monarchy limited by law. Such a government required no assistance, but what was derived from the constitution and the laws. The powers, vested in the executive part of government, were ample and sufficient for all the purposes of good government; and, without any farther aid, much too ample for the purposes of bad government. And he thought himself bound, as an honest man, to say, that the influence of the crown had increased much beyond the ideas of a monarchy strictly limited in its nature and extent." See New Annual Register, 1780, p. 148.

Sir William Blackstone, speaking of the ancient prerogatives of the crown, and of the bounds set to them, at the revolution, says " though these provisions have, in appearance and nominally, " reduced the strength of the executive power to a much lower " ebb than in the preceding period; if, on the other hand, we " throw into the opposite scale (what perhaps the immoderate  
 Vol. III. S f " reduction

“reduction of the ancient prerogative may have rendered, in  
 “some degree, necessary) the vast acquisition of force, arising  
 “from the riot act, and the annual expence of a standing  
 “army; and the vast acquisition of personal attachment, arising  
 “from the magnitude of the national debt, (now, 1788, augmented one hundred millions) and the manner of levying those  
 “yearly millions that are appropriated to pay the interest; we  
 “shall find that the crown has, gradually and imperceptibly,  
 “gained almost as much in influence, as it has apparently lost  
 “in prerogative.” Commentaries, B. IV. ch. 33.

Mr. Hume observes, that, “on a moderate computation,  
 “there are near three millions a year at the disposal of the  
 “crown. The civil list amounts to near a million; the collection of the taxes to another; and the employments in the army  
 “and the navy, together with ecclesiastical preferments, to above  
 “a third million: An enormous sum, and what may fairly be  
 “computed to be more than a thirtieth part of the whole income,  
 “and labour of the kingdom.” Essay VII. vol. I. p. 49, 8vo. edit. But Mr. Hume's remarks were first published in 1742; since which period, the national debt has been more than doubled. The army has been increased, and ecclesiastical preferments have been considerably augmented in value. An immense patronage has also been established in the East-Indies. That of America has indeed been lost; but, in a comparative view, it was of small estimation.

The influence of the crown may be considered in two points of view; first, as it respects the exercise of the royal prerogative; secondly, as it affects the freedom and independence of parliament. In the first, we must regard the exercise of every branch of the royal prerogative, as no other than *a discretionary power to do good*; and consequently that every appointment to civil or military offices, except of persons known or believed to be best qualified for their execution; every distinction of rank conferred on those who are not of adequate desert; and every reward given, but for real services to the state, is a violation of a trust reposed in the supreme magistrate. In the second point of view, we are to consider each individual, composing the two branches of the  
 legislature,



legislature, as under a sacred obligation, to weigh, attentively, all questions, that relate to the public interest; and to vote upon them agreeably to his honest and serious conviction. If he deviate from this rule, he betrays his trust, and forfeits the character of patriotism, probity, and honour: And if the crown have seduced him, by office, titles, or pecuniary reward, the double guilt is incurred of violating its own duty, and of inciting another to a correspondent violation.

What then is just and honourable influence? In the sovereign, it is to stimulate to exertion, and to excite steadiness in duty, by well-grounded respect, gratitude, and attachment. In the subject, it is to feel these principles in all their force, but with a proper attention to their true object; to discriminate between the personal and official capacity of the supreme magistrate; and whenever a competition subsists between their respective interests, to regard himself as the beneficiary of the public, and as thus bound, by an additional obligation, to fulfil the duties of his station, either as a military commander, a magistrate, or a legislator. This distinction the emperor Trajan nobly maintained, on the appointment of Suberanus, to be captain of the prætorian guard. Presenting him with a sword as the badge of his fealty, he said, "Let this be drawn in my defence, if I rule according to equity; but if otherwise, it may be employed against me."\* With the same magnanimity he would have addressed a præfect of the treasury, or of the city. "I have invested you with a post of high dignity, authority, and emolument, because I have confidence in your talents and your virtues. Manifest your sense of the favour, by your zeal in my service; always remembering however that my service implies only that of the commonwealth." Prince Kaunitz, the minister of the imperial court of Vienna, is applauded by Mr. Necker, for his impartiality, integrity, and dignity of character, in the choice of persons to fill up the great offices of state. He relates, that having persuaded the empress Maria Theresa, to bestow the conduct of the war department on a general of great ability, but

\* Plinii Epistolæ.

whom he had just reason, as an individual, to dislike ; the commander, affected by so generous an action, earnestly wished for a reconciliation. Prince Kaunitz, however, declined all his advances ; observing that he had only done his duty, in causing his sovereign to pay due regard to merit ; but that in the direction of his private intimacies or connections, he was subject to no controul, and might, in perfect consistence with duty, indulge an entire freedom of choice. This fact well illustrates the true application and extent of influence.

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Note (C) p. 17.

#### DOCTRINE OF PASSIVE OBEDIENCE.

Mr. Hume has very facetiously imputed *Toryism* to SOCRATES ; because, by, declining to make his escape out of prison, he sanctions the doctrine of passive obedience and non-resistance. But the truth is, this venerable philosopher disdained to save the short remnant of his days by an ignominious flight ; by practising the arts of corruption ; or, by involving the ministers of justice in the guilt of betraying their trust. He does not appear to have treated the tumultuous assembly, which sat in judgment upon him, with *passive* deference. " Be not offended Athenians ;" he said, " it is impossible, that any one should long preserve his life, who arraigns, with intrepidity, your licentiousness and injustice !"

In the admirable arguments for submission to the laws, which Plato has put into the mouth of his master, in the dialogue entitled CRITO, the obligation of the *social compact* appears to be expressly and forcibly pleaded. Very able writers have contended for and against this alledged foundation and bond of civil society. It has been condemned, as built on the chimerical supposition, that " savages have been called out of caves and deserts, to deliberate " and vote upon topics, which the experience, the studies, and  
" the

"the refinements of civil life alone suggest."\* But the supposition involves in it no such absurdity. Savages could never assemble together or live in community, without some common principles of harmony and agreement. And each individual feeling their influence and yielding to their authority, a social compact was thus established without deliberation or formal design, by laws which result from the original constitution of human nature. The veneration of age; respect for superior talents or virtues; a sense of justice, of veracity, and honour; a regard to common interest; the defence against, or invasion of common enemies substantiated these laws. They were voluntarily acquiesced in by all; they became confirmed by time; improved by experience; and enlarged by the progressive advancement of society.

It is said, that & if by virtue of a compact, the subject owes "obedience to government, he ought to abide by the form of "government which he finds established, be it ever so absurd or "inconvenient. He is bound by his bargain."† This objection will appear to have no validity, when it is recollected that it is not an ordinary bargain or contract, in which two parties are supposed, of opposite interests; but an union or partnership, in which all are equally concerned, though with various trusts and designations. To the first and necessary laws of this union, which constitute the essence of government, submission is absolutely due. Governors, who are the organs of administration, are equally subject to them with the governed. And as these governors represent the majesty and authority of the whole, it is evident that the whole, or a majority of the whole (which can alone act) are superior to their representatives; and may enlarge, circumscribe, or new-model the authority which they delegate, as they shall deem most expedient. The public good however requires that government should possess stability, because revolutions are usually attended with much present suffering and evil. Civil magistrates, therefore, are invested with powers and prerogatives adequate to

\* See Paley's Principles of Moral and Political Philosophy, book VI. ch. 3, p. 416. 4to.

† *Ibid.* p. 421.

extraordinary emergencies: And the policy of this is so clear and rational, as to command general acquiescence, or implied consent.

It is further alledged that "if every man has a right to surrender his independance on bargain, (whether exprefs or implied) he must have an equal right to retain it."\* This is a fallacy: For as man is by nature a social being, society is essential to his improvement and happiness. But society cannot subsist without civil polity; that is, without such laws and regulations, as are necessary to guard against imperfection and depravity. And man being also rational as well as social, he is bound not to withhold his consent from what is conducive to his interest and felicity.

Government is asserted to have been "at first, either patriarchal or military; that of a parent over his family, or of a commander over his army."† When the offspring of the patriarchs had attained the age of discretion, and the capacity of judging and acting for themselves, it is evident that their submission to paternal authority must have been voluntary; and it could only be voluntary, on terms of reciprocal benefit and comfort. Such terms though not expressed, must be understood; and consent, on implied terms, is in its nature a tacit compact. When two or more patriarchal families united together, the compact was, probably, exprefs and not implied.

If government was at first military, this presupposes compact: For no individual could have sufficient force to compel numbers to submit to his authority, and combine for its extension. Their union with him, and subjection to him, must have been by choice and agreement. A civil polity was, therefore, constituted antecedent to conquest; and I presume, conquest will not be deemed a legitimate foundation of any government.

\* *Disquisition on Government and Civil Liberty*, by Soame Jenyns, Esq. A very excellent answer, to this Disquisition, appeared in 1781; printed for Debrett, in Piccadilly.

† *Paley's Moral Philosophy*, p. 399.

Every just government seems to include, in its constitution, the three following acts of the community. I. A compact to unite together, to be governed in their common interests, by common laws. II. An agreement respecting the persons to be intrusted with the framing and the administration of the laws. III. A reciprocal agreement between the governors, thus constituted, and the governed.\* At the glorious revolution in 1688, these several acts may justly be said to have taken place. For the prince of Orange, in his declaration, invites and requires all the peers of the realm; all gentlemen, citizens, and other commons, of all ranks, to come and assist him in the execution of his design, to re-establish the constitution of the English government. The convention, which assembled on this ever memorable occasion, deposed the supreme magistrate, *expressly* because he had broken the *original contract*; and appointed another on certain stipulated terms, declarative of the reciprocal duties of king and people; and reducing the contract, as Sir William Blackstone observes, before built on theory and natural law, to a plain certainty. The same learned Judge remarks, that the original contract is now comprehended in the coronation oath, and in that of allegiance.†

When Maria Theresa ascended the throne of Hungary, in 1740, she took the ancient oath as follows. "If I, or any of my successors, shall at any time infringe upon your privileges; *by virtue of this promise*, you and your descendants shall be allowed to defend yourselves, and shall not be treated as rebels." It should seem that the two last kings of Prussia regarded the privileges of their subjects as conferred, not confirmed, by

\* Consult Hucheson's System of Moral Philosophy, vol. II. p. 227.

† See Blackstone's Commentaries, book I. p. 233.

N. B. These notes and illustrations were written before the revolution in France, an event which confirms many of the principles that have been advanced. The Count Boulainvilliers, who ridicules the notion of an ORIGINAL CONTRACT, although himself a republican, had he lived at this period, would have seen the doctrine established in his own country, as well as in that of America.

virtue of the coronation oath; and therefore they declined the ceremony of a coronation; probably because, according to usage, it would have obliged them to an explicit declaration of the duties owing to their subjects. Baron Bielfield, in one of his letters, thus expresses himself. "Frederic I. of Prussia, had good reasons for *submitting* to that ceremony; but his successors receive the crown from the hands of Providence, and not from their subjects. They content themselves with administering the oath of fidelity to the troops, to the nobility, and to the people."\*

Mr. Hume argues against the original contract with much acuteness: yet he candidly acknowledges, that the consent of the people, where it has place, is the *best and most sacred foundation of government*. But the converse to the best and most sacred can never be, in any degree, good or sacred. If full consent render government most legitimate, the entire want of it, or absolute force, must constitute the most unjust tyranny. A scale may thus be formed between these extremes, by which the degree of legitimacy in every civil establishment may be estimated.

In the Essay on Taxation, I have adopted the expression SOCIAL UNION, as more comprehensive than any other, because it involves in it all the *rights* and *duties*, that reciprocally belong to the individuals of which it is composed. The obligation to it is antecedent to compact, consent, or expediency. It is the ordinance of God, manifested in the constitution of our nature. For no man has the moral, though he may have the physical power, to withdraw himself entirely from the intercourse of his fellow creatures; as it would be, in a great degree, the extinction of being, so far as relates to virtue and intellectual improvement, which are the chief objects of it. Civil polity is a consequence of the social union, the mode of which is regulated by temporary expediency, and confirmed by compact, or consent. But no original compact, or consent can give permanent validity, to what is inconsistent with the fundamental principles of the SOCIAL UNION. *Salus populi suprema lex.*

\* See Towers's Life of the King of Prussia, vol. I. p. p. 82, 115.

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Note (D) p. 18.

THE DOCTRINE OF NON-RESISTANCE MERELY  
SPECULATIVE.

In the year 1610, James I. thus expresses himself, in his speech to both houses of parliament. "As it is atheism and blasphemy, in a creature, to dispute what the Deity may do; so it is presumption and sedition, in a subject, to dispute what a king may do, in the height of his power. "Good thriftians," he adds, "will be content with God's will revealed in his word; and good subjects will rest in the king's will, revealed in his law."\* The king's speech is now always supposed, by parliament, to be the speech of the minister. How cruel would it have been on king James's ministers, says Mr. Horace Walpole, if that interpretation had prevailed in his reign!

Those who adopt the doctrines of indefeasible right, and absolute dominion, deceive both their sovereign and themselves; and sanction tyranny by speculative principles, which it is not in human nature to carry into practice. *The judgment and decree of the university of Oxford, passed in the convocation, July 21, 1683, against certain pernicious books and damnable doctrines, destructive to the sacred persons of princes, their state and government, &c. was fully contravened, in its most essential point, by the conduct of her own members at the revolution. The decree was drawn up by Dr. Jane of Christ Church, who was afterwards one of the four delegates from the university to offer their plate to the Prince of Orange, when on his march to London: And in 1710,*

\* See King James's Works, Rapin's History, vol. II. p. 178.

it was burnt by the common executioner, in obedience to the order of the house of peers.\*

When the great Lord Russel was condemned, on account of the Rye-house plot, in 1683, Dr. Tillotson and Dr. Burnet were both anxiously assiduous in their endeavours to persuade his Lordship, that "the christian religion absolutely forbids the resistance of authority; and that it is not lawful, on any pretence whatsoever, to take up arms against government." The impression they made on the mind of their noble friend may be collected from the following passage in his speech. "For my part, I cannot deny, but I have been of opinion, that a free nation, like this, might defend their religion and liberties, when invaded and taken from them, though under pretence and colour of law. But some eminent and worthy divines, who have had the charity to be often with me, and whom I value and esteem to a very great degree, have offered weighty reasons to persuade me, that faith and patience are the proper ways for the preservation of religion, and the method of the gospel is to suffer persecution, rather than to use resistance. But, if I have sinned in this, I hope God will not lay it to my charge, since he knows it was only a sin of ignorance."†

The passages in the New Testament, wherein obedience to magistracy is so emphatically inculcated, are justly supposed to have been particularly addressed to the Gaulanites, a wild and deluded party, the followers of Theudas, a native of Gaulan, in Upper Galilee. This fanatic, in the tenth year of Jesus Christ, "which was the last of Augustus, excited his countrymen the Galilæans, and many others of the Jews, to take arms and venture upon all extremities, rather than pay tribute to the Romans. The principles he infused into his party were, not only that they were a free nation, and ought to be in subjection to no other; but that they were the elect of God, that he alone was their governor, and that, therefore,

\* Birch's Life of Tillotson, p. 189.

† Idem, p. 116.



“ they ought not to submit to any ordinance of Man. And though he was unsuccessful, inasmuch that his party, in their very first attempt, were entirely routed and dispersed; yet so deeply had he infused his own enthusiasm into their hearts, that they never rested, till, in their own destruction, they involved the city and temple.” \* It must be recollected, also, that the followers of Jesus had long a prepossession that the Messiah was to enjoy a temporal kingdom and authority; and that, under his dominion, Judea was not only to recover her independency, but even to subvert the Roman power. Hence the seducing question proposed to our Saviour, *Is it lawful to pay tribute to Cæsar, or not?* And St. Paul delivers this express injunction, *Render, therefore, unto all their dues: tribute to whom tribute is due; custom, to whom custom; fear, to whom fear; honour, to whom honour.* But, though it be true that *Christ's kingdom is not of this world; that every soul is to be subject unto the higher powers; and that whosoever resisteth the power, resisteth the ordinance of God,* yet we are, at the same time, assured, that *rulers are not a terror to good works, but to the evil; that they are ministers of God to us, for good; and that, for this cause, we pay tribute.* From hence, I think, it is clearly to be inferred, that magistracy is the ordinance of God, for the good of society; but that the duty of allegiance is exactly proportionate to its adaption to the great ends of its institution.

It is curious to observe how consonant the law of England, relative to the disputed titles of our sovereigns, is to the maxim of the great apostle of the Gentiles, *the powers that be are ordained of God.* The eleventh statute of Henry VII. recites, that “ the subjects of England are bound, by the duty of their allegiance, to serve their prince and sovereign lord, *for the time being,* in defence of him and his realm against every rebellion, power, and might raised against him. And that whatsoever may happen in the fortune of war against the mind and will of the prince, *as in this land,* some time past, it hath been *seen;* it is not reasonable, but against all laws, reason, and

\* Percy's Key to the New Testament.

"good conscience, that such subjects, attending upon such service, should suffer for doing their true duty and service of allegiance." This," says Sir Michael Foster, "putteth the duty of the subject upon a rational and safe bottom. He knoweth that protection and allegiance are reciprocal duties. — He seeth the fountain, from whence the blessings of government, liberty, peace, and plenty flow to him; and there he payeth his allegiance."\*

Having made the foregoing quotation from the works of this excellent judge, I am tempted to add a few more passages, on the subject of government, from the same invaluable discourse. Some learned men "seem not to have sufficiently attended to the nature and ends of civil power, whereof the regal dignity is a principal branch. They seem to have considered the crown and regal dignity merely as a DESCENDABLE PROPERTY; or an estate or interest vested in the possessor, for the emolument and grandeur of himself and heirs, in a regular invariable course of descent. And therefore, in questions touching the succession, they constantly resort to the same narrow rules and maxims of law and justice, by which questions of mere property, the title to a pig-stye or a lay-stall are governed. — If I could conceive of the crown as an inheritance of mere property, I should be tempted to argue in the same manner. But had they considered the crown and royal dignity, as a descendable OFFICE, as a TRUST for millions, and extending its influence to generations yet unborn; had they considered it in that light, they would soon have discovered the principle upon which the right of the legislature to interpose in cases of necessity is manifestly founded. And that is the SALUS POPULI, already mentioned upon a like occasion."† — "All the rights and powers for defence and preservation belonging to society are nothing more than the natural rights and powers of individuals trans-

\* See Sir Michael Foster's Discourses on the Crown Law, Folio, P. 399.

† Id. p. 404.

"ferred

“ferred to and centering in the body, for the preservation  
 “of the whole. And, from the law of self-preservation, con-  
 “sidered as extending to civil society, resulteth the well-known  
 “maxim *salus populi suprema lex*.

“I think the principles here laid down must be admitted,  
 “unless any one will choose to say, that individuals in a commu-  
 “nity are, in certain cases, under the protection of the primitive  
 “law of self-preservation; but communities, composed of the  
 “same individuals, are, in the like cases, excluded. Or, that  
 “when the enemy is at the gate, every single soldier may and  
 “ought to stand to his arms, but the *garrison* must surrender at  
 “discretion.” \*

Note (E) p. 32.

#### ADVANTAGES OF THE BRITISH GOVERNMENT.

Thomson, whose authority may be quoted, as a moralist and philosopher, has admirably described the British constitution, in the second canto of his *Castle of Indolence*:

Whereas the knight had fram'd in Britain land  
 A matchless form of glorious government,  
 In which the sovereign laws alone command;  
 Laws establish'd by the public free consent,  
 Whose majesty is to the sceptre lent.

Under this view of our constitution, loyalty, in a Briton, is a rational and patriotic principle. It is not a blind and servile attachment to the person or family of the monarch; but a reverence for him, as the minister of law and justice, and the patriarch of his people. If, however, his private and public virtues happily merit confidence and esteem, subjection will be accompanied with cordial satisfaction; and obedience performed

\* Id. p. 382, 383.

with promptitude, zeal, and love. This warmth of loyalty ought to be peculiarly encouraged in a free state ; because it may often be found necessary to counteract the insidious arts of faction, or the enterprizing spirit of aristocratic ambition.

It is a common observation, adopted even by some republican writers, that an absolute monarchy is the best of all forms of government, provided a succession of wise, virtuous, and patriotic sovereigns be insured. But, admitting the supposition, however improbable it may be, I am persuaded it is essential to the highest interests of the people, that they possess a share in the administration ; and that the calm of despotism, even under a Titus or an Antoninus, would be less favourable to moral and intellectual improvement, than the agitations which occasionally arise in our mixed system of polity. These agitations diffuse the love of our country, kindle the ardour of ambition, animate the spirit of enterprize, and call forth into public exertion many talents, which might otherwise have remained in obscurity.

This is true liberty, when free-born men,  
Having to advise the public, may speak free ;  
Which he who can and will, deserves high praise,  
Who neither can nor will may hold his peace :  
What can be juster in a state than this !\*

These high and important privileges inspire a veneration for the dignity of the human character, and a disdain of whatever tends to the degradation of our species. And the enthusiasm of liberty, thus roused, extends itself beyond our country : We learn to regard ourselves as citizens of the world, and become assertors of the equal and unalienable rights of all mankind.

It is to the influence of this magnanimous principle, that we may reasonably ascribe the noble efforts, which have been lately made, towards accomplishing the abolition of slavery and the African slave trade. " A Slave, or a Negro," says Judge Blackstone, " the moment he lands in England, falls under the

\* Milton, Motto to the *Areopagitica* ; translated from Euripides.

" protection

“protection of the laws; and, so far, becomes a freeman—This “spirit of liberty is rooted even in our very soil.”\* But I trust, it is not to be *locally* circumscribed; that it is deeply implanted in our minds; and that, according to the assertion of Fortescue, *Anglia jura, in omni casu, libertati dant favorem*.† In the case of Somerset, the negro, decided in 1772, it was the judgment of the court of king’s bench, that the master could not recover his power over his servant, by sending him abroad, at pleasure. And the chief court of justiciary in Scotland, in 1778, made an award against John Wedderburn, in favour of Joseph Knight, an African, “that the dominion assumed over this negro, under “the law of Jamaica, BEING UNJUST, could not be supported, “in this country, to *any* extent: that, therefore, the defender “had no right to the negro’s service, for any space of time; “nor to send him out of the country against his consent.”‡ So explicit a condemnation of the servitude of the negroes, by very high legal authority, clearly implies a condemnation, equally strong, of that infamous traffic from which it originates; exclusively of every consideration, relative to the barbarity with which it is conducted.

From the report of the lords of the committee of council, concerning the present state of the trade to Africa, and particularly the trade in slaves, it appears that this traffic is frequently carried on by *kidnapping*, and bears a close analogy to *piracy*. The former is defined by Judge Blackstone, “the “forcible abduction, or stealing away of man, woman, or child, “from their own country; and selling them into another.” By the Jewish law, this was a capital offence: *He that stealeth a man, and selleth him, or if he be found in his hand, shall surely be put to death*, Exodus xxi. 16. By the civil law, also, the crime termed *Plagium* was capital, which consisted in spiriting away,

\* Comment. book I. chap. 1. p. 12.

† De laud. leg. Ang. cap. 42. One nation there is in the world that has, for the direct end of its constitution, political liberty. Montesquieu’s Spirit of Laws. vol. I. p. 215.

‡ Millar on the Origin of Ranks, edit. third, p. 361.

and stealing men and children.\* Piracy is an offence against the universal law of society; a pirate being, according to Sir Edward Coke, *hostis humani generis*. And, by statute 8 Geo. I. the trading with known pirates, or furnishing them with stores or ammunition is deemed piracy; and all accessories to piracy are declared to be principal pirates, and felons without benefit of clergy.† Surely the crime of piracy, in its essence and degree, is the same, to an enlightened mind, on the coasts of Africa, as on those of Europe: And we condemn, with as full conviction of their enormity, the depredations of the knights of Malta on the peasants, fishermen, and sailors of Barbary, as we do those of the Corsairs of Tunis, and Algiers, on the state of Italy.‡

Servitude is founded, by those civilians who deem it lawful, on voluntary compact; on captivity; on debt; and on the power of the magistrate in the punishment of crimes.

Slavery, founded on *voluntary compact*, must in itself be void; because man, being an accountable creature, has not in himself

\* Blackstone's Comment. book IV. chap. 15.

The extent of this crime, as practised on the coast of Guinea, overpowers the sense of its enormity, and of the miseries produced by it. Of these miseries we may form an estimate, by the following affecting account of the sufferings of a few natives of another part of the globe, on being forced away from their country, their families, and friends. Christiern IV. king of Denmark, sent three ships to make discoveries on the coast of Greenland. The commanders of these vessels carried off several of the natives, who, when first captured, "rent the air with their cries and lamentations. They leaped into the sea; and when taken again on ship-board, for some time refused all sustenance. Their eyes were continually turned towards their dear country, and their faces always bathed in tears. Even the countenance of his Danish majesty, and the caresses of the court and people could not alleviate their grief. One of them was perceived to shed tears always when he saw an infant in the mother's arms; a circumstance from whence it was naturally concluded, that he had left his wife with a young child in Greenland." See Encyclop. Britan. Art. Greenland.

† Blackstone's Comment. book IV. chap. 5.

‡ Howard on Lazarettos, p. 52.

a right to dispense with that accountableness, or to yield up his will and conduct to the absolute disposal of another. Besides, every compact implies reciprocal and proportionate benefit. But what benefit can he derive from an act, which divests him of all the capacities for property, all the rights of a citizen, and all the honourable distinctions of a rational being? *Captivity* cannot itself be justified, except as the consequence of *lawful* war. And the prisoners, though they may properly be compelled to work for their own maintenance, or, perhaps, in some special instances, to make compensation for damages sustained, owe no farther services to their captors; and have a natural right to be restored to liberty, when such obligation has been fulfilled, or whenever there shall be a cessation of war. In the case of *debt*, also, the claim to servitude is limited, extending only to the retribution of the creditor; and never involving in it any right over posterity. As a *punishment* for crimes, slavery may sometimes be deemed both reasonable and politic; but, in its duration and severity, it must be exactly proportionate to the offence: And, as most punishments are intended for reformation, no less than for example, the benefit of the slave and of the public is to be the sole standard of its measure. How little applicable are these canons to the justification of slavery, as it formerly subsisted in Europe; or to the practice of transporting slaves from the coast of Africa to our colonial possessions!—But the authority of the holy scriptures is pleaded. To the Jewish laws and customs we owe no obedience; and the evangelical code will assuredly be found repugnant to slavery, in its doctrines, its precepts, and the example of its divine founder. We are therein taught, that all mankind are equally the children of one common Father, redeemed by the same Saviour, and joint heirs of glory and immortality. We are commanded *to love our neighbours as ourselves*; and *to do unto others, as we would they should do unto us*. And our divine master was himself meek and lowly in spirit, condescending to men of low estate, and continually going about to do good. Converted servants, indeed, *under the yoke*, are enjoined *to count their own masters worthy of all honour*. This, however, can only mean all reasonable honour: And the believ-

ing masters are, at the same time, instructed *not to despise their servants, because they are brethren; but, rather, to do them service, because they are faithful and beloved partakers of the benefit.* 1 Tim. vi. 1, 2. Several of the injunctions of scripture, regarding submission, are to be considered as *prudential*, not as *moral* precepts. *If a man smite thee on the right cheek, turn to him the left also. And, if any man take thy cloak, let him have thy coat also.* Such a rule could relate only to the particular circumstances and situation of those, to whom it was delivered. And the command to bear injury, oppression, or injustice can, in no instance, give a sanction to the commission of those crimes.

St. Paul addresses an epistle to Philemon, a native of Colosse in Phrygia, in behalf of Onesimus, his slave; who had robbed and run away from him, but was, afterwards, converted to the Christian faith, at Rome. The Apostle says, *I beseech thee for my son Onesimus, whom I have sent again: Thou, therefore, receive him that is my own bowels, not now as a servant, but above a servant, a brother beloved, specially to me; but how much more unto thee in the flesh and in the Lord!*\* Servitude, under such circumstances, is *virtually* annihilated. And it was by the spirit of meekness and brotherly love, that christianity was adapted to promote a gradual abolition of the cruel bondage, in which more than two thirds of the Roman empire were held, at the time of its promulgation.

Note (F) see page 24.

#### TAXES ON THE NECESSARIES OF LIFE.

At Tobolski, in Siberia, the price of provisions is so extremely low, that it seems to encourage both idleness and debauchery in

\* It has been conjectured, that Onesimus received his freedom, and was afterwards bishop of Bercea in Macedonia. "When Ignatius wrote his epistle to the Ephesians, about the year 107, their bishop's name was *Onesimus*; and Grotius thought him to be the same, for whom Paul interceded with *Philemon*." Lardner's History of the Apostles. Bishop Watson's Theological Tracts, vol. II. p. 297.



the inhabitants ; for the labour of one day furnishes sufficient support for a whole week, and every additional exertion supplies the means of riot and excess.\* Sir William Temple, in his comparison between the people of Ireland and the Netherlands, ascribes the laziness of the former to the like cause. " For " men," says he, " naturally prefer ease before labour, and " will not take pains if they can live idle ; though, when by necessity they have been inured to it, they cannot leave it, " being grown a custom necessary to their health and very entertainment."† But in Siberia and in Ireland, the inhabitants having never seen or tasted the enjoyments procured by industry, and being in a state of oppression, from which they have not the power to free themselves, they are destitute of adequate incitements to exertion : Whereas in the provinces of America, though the price of labour is very high, and the necessaries of life still more cheap and plentiful than in the countries above-mentioned, industry subsists in its full energy. The evils, flowing from high wages and the cheapness of provisions, are chiefly observed in our great manufacturing towns, and in the districts immediately dependent upon them. In the kingdom at large, such consequences are not experienced ; yet the country working poor are supposed to constitute three fourths of the whole body of labourers : So that the adoption of a maxim, which is just and salutary with respect to the ingenious but profligate inhabitants of towns, may prove injurious to the more sober, orderly, but less active inhabitants of the country ; who are also the great sources of population. For it appears, from Mr. Howlet's calculation, that, at Dunmow in Essex, two hundred and sixty poor families have four hundred and sixty children ; whereas one hundred and sixteen families, of the ranks above them, have only one hundred and twenty children.

\* Lord Kaimes's History of Man. vol. II.

† Account of the Netherlands, chap. VI.

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Note (G) see page 29.

STATUTES OF EXCISE.

It is the complaint of an enlightened French statesman, M. Turgot, that the established rule of finance, in all doubtful cases, is to make the decision in favour of the revenue; and that, by the complication of laws, almost every case is rendered doubtful. M. Necker also observes that, when the taxes are immoderate, when they even exceed certain limits, exactness is augmented in proportion to the difficulty of collection: It becomes necessary to give greater authority to the collectors; to be inflexible to complaints; to venerate the science of finance; and to honour all the professors of it, without distinction.

As the finances of the kingdom are now said to be in a flourishing state, and as the annual collection of more than fifteen millions bears so large a proportion to the whole capital stock and income of the community, it may be hoped that the legislature will engage in a thorough revision of the laws of revenue, with a view, not merely to their productiveness, but to their equity and consistency with the rights of the people. Tacitus records the justice of an edict of Nero, commanding the prætor of Rome, and similar officers in the provinces, to receive complaints against the publicans, and to redress the wrongs, committed by them, on the spot.\* Let us compare this with the conduct of Frederick II. king of Prussia, whose tax gatherers supported the double office of exciseman and judge; so that if a tenant did not pay his assessment, on the very day appointed, the collector put on the magisterial robes, and fined the delinquent in double the sum.†

\* *Annal.* xiii. 51.

† *Towers's Life of the King of Prussia,*

A very judicious writer, on the subject of taxes,\* remarks "that though vexation is not, strictly speaking, expence, it is "certainly equivalent to the expence, at which every man would "be willing to redeem himself from it." This important consideration pleads strongly for a revival of the excise laws; by which six millions and a half, a sum equal to two fifths of the whole revenue of the state, are raised chiefly from the arts and industry of the people. It is said, that the number of informations, tried in one year, amounted nearly to five thousand; but the actual forfeitures only to seven thousand pounds. A fuller proof can hardly be adduced that frivolous and vexatious suits are often instituted, even under the present just and lenient government. What oppression, therefore, may be dreaded from a farther extension of an uninterrupted system of excise, if power and long usage shall hereafter silence the public voice against it!

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Note (H) page 30.

O A T H S.

In the edict of the Grand Duke of Tuscany, for the reform of Criminal Law, of which the benevolent Mr. Howard has favoured me with a copy, it appears that the number of oaths are greatly diminished; and that they are administered with the utmost solemnity and reverence. As this tract is not published, I shall transcribe the following paragraphs from it.

"In consequence of the foregoing regulations, instead of the warning to declare the truth, which it was for the judge in the process to give the witness, previous to his taking his oath, the said officer shall represent to him, that the laws, both human and divine, make it the duty of every man not to attest a falsehood,

\* Smith on the Wealth of Nations, book V. chap. II. part II.

nor to declare himself ignorant ; he is likewise to remind him, not only of the importance of that obligation, but also that he is liable to be obliged to confirm by oath, at the request either of the accused, the plaintiff, or the injured party, whatever he is about to declare, in reply to the simple queries that are to be put to him."

" And we order that, in whatever case and circumstance it may be permitted to administer an oath, let it be to whom it will, and on any occasion whatsoever, the judge or public officer, carrying on the trial, before he administers the said oath, shall represent, to the person, the obligation that accompanies it, explaining to him its meaning and importance ; and to the end that it may make a greater impression, we abolish the simple formality of touching a leaf of the Bible only, instead of which the person shall kneel down, and swear before a crucifix. When the person, who is about to swear, is of a religion different from ours, he shall take his oath in the form the most respected and dreaded by those of his own persuasion, the great importance of the undertaking having previously been represented to him."

Mr. Howard, in his Observations on Foreign Prisons, informs us that, in *La Prison Ordinaire* at Bern, a serious exhortation is hung up, concerning the awful nature of an oath, together with the forms of those, which are to be taken. He transcribes the one following. " My deposition, which has now been read to me, I confirm before the face of God omnipotent, omniscient, and true, to contain the truth, as I desire that God may be my help, at the end of my days." The same excellent author speaks, with much approbation, of the mode of administering oaths in Scotland ; and asserts that perjury is not frequent in that country. But I know not how to reconcile this observation with what Lord Kaims, a late respectable judge of the court of session, has delivered, in his *Loose Hints on Education*. " Custom-house oaths," says his Lordship, " now a days, go for nothing. Not that the world grows more wicked, but because no person lays any stress upon them. The duty on French wine is the same in Scotland, and in England. But as we cannot afford to pay this high duty, the permission, underhand, to pay  
" Spanish

" Spanish duty for French wine, is found more beneficial  
 " to the revenue than the rigour of the law. The oath how-  
 " ever must be taken, that the wine, we import, is Spanish, to  
 " entitle us to the ease of the Spanish duty. Such oaths, at  
 " first, were highly criminal, because directly a fraud against  
 " the public; but now, that the oath is only exacted for form's  
 " sake, without any faith intended to be given or received, it  
 " becomes very little different from saying, in the way of  
 " civility, *I am, Sir, your friend, or your obedient servant.* And  
 " in fact, we every day see merchants, dealing in such oaths,  
 " whom no man scruples to rely upon, in the most material  
 " affairs."

Such Machiavelian sentiments, offered by a learned judge,  
 must surprize and shock every well-informed and well-principled  
 mind. But I shall make no other comment on them, than that  
 they irrefragably evince the corrupting influence of the present  
 multiplication of oaths, on the moral opinions as well as practices  
 of mankind.

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Additional Note, page 19, line 16.

TURPITUDE MARKED BY THE GROSS DEFECT OF GOOD  
PRINCIPLES, &c.

The distinction of *positive* and *negative* turpitude is of con-  
 siderable importance in ethics. Yet there may subsist great  
 apathy, or defect of good principle, in a mind virtuous, as to its  
 general constitution. The people of Hindostan are remarkable  
 for the gentleness of their dispositions, the softness of their man-  
 ners, and the force of their attachments in love. Yet they seem  
 to be devoid of compassion and generosity. They are said to be  
 unaffected by the distresses, the dangers, or even the death of a  
 fellow-creature. " An English Gentleman was standing by a  
 " Hindoo, when a fierce and ravenous tiger leaped from a

“thicket, and carried off a screaming boy, who was the son of  
“one of his neighbours. The Englishman expressed symptoms  
“of the most extreme horror; whilst the Hindoo remained un-  
“moved. What! said the former, are you unaffected by so  
“dreadful a scene? The great God, replied the other, would  
“have it so.”\*

\* See Annual Register, for 1752, p. 36.

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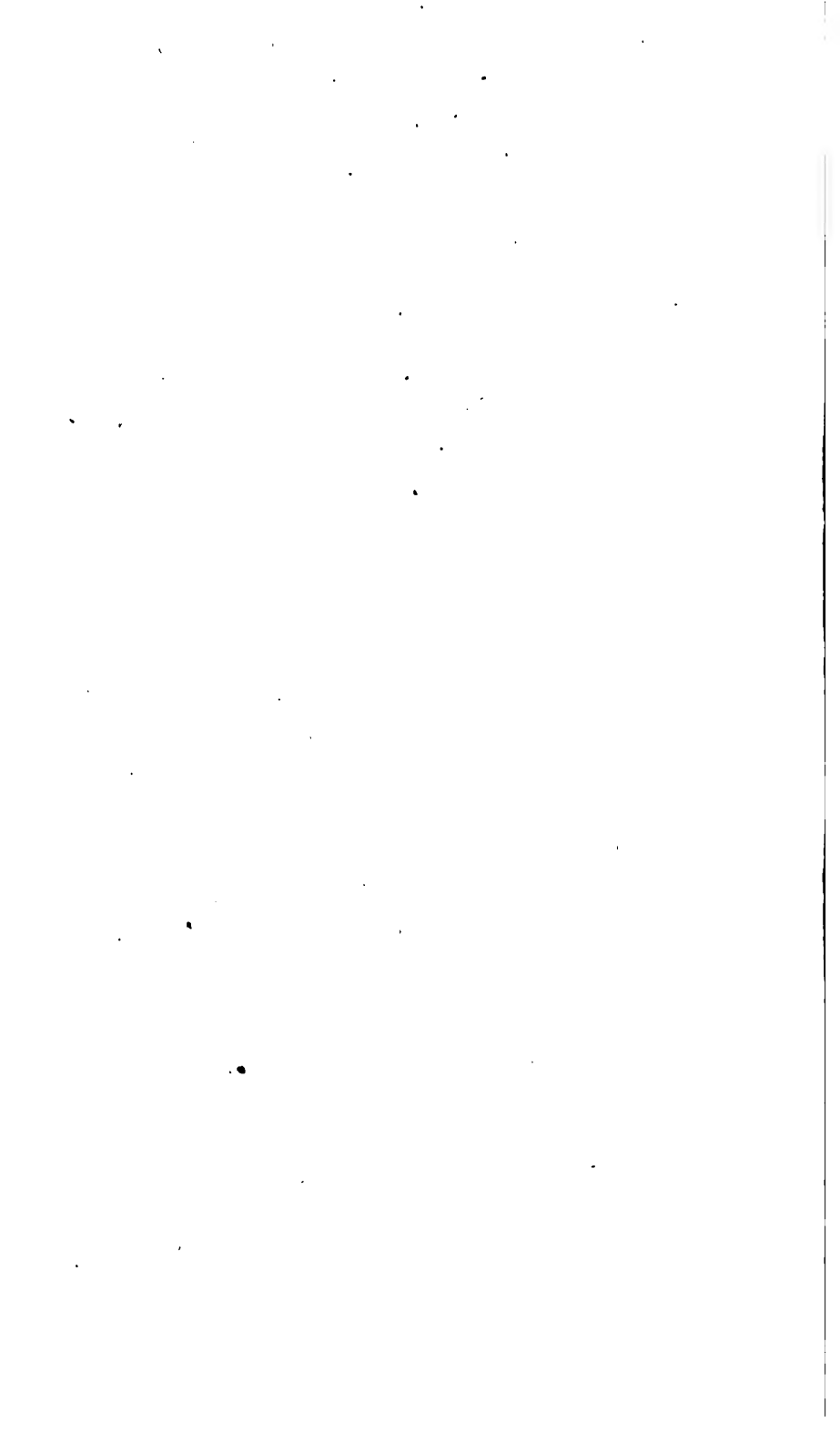
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# ERRATA.

- Page 27, line 9 from the bottom, for *forbid* read *forbad*.  
 78, 10 from the bottom, insert the reference to note (R).  
 80, 14, dele (R).  
 83, 13, after "revive and" insert "those of."  
 85, 2 from the bottom insert (X).  
 160, 14, for *manufactures* read *manufacturers*.  
 203, 22, for *But the astringency, &c.* read *And the astringency of it, according to my trials, accompanies its colouring matter*.  
 215, 10 from the bottom, for *computation* read *computation*.  
 5 from the bottom, for *properties* read *properties*.  
 222, last line, after *ideoque* dele *deoque*.  
 230, lines 6, 7, for *comcom* read *common*.  
 296, line 6 from the bottom, for *care* read *ease*.  
 315, 16, for *and in others* read *and others*.  
 426, 8, for *regard* read *regarded*.  
 453, 22, for *in quit* read *inquit*, and for *indagundas* read *indagunda*.  
 497, 8, for *ledas* read *ladas*.  
 507, 5 from the bottom, dele *if* after *Hence*.  
 508, lines 3, 4, for *there must be some rise* read *some must rise*.  
 514, line 5, for *εξοχην* read *εξοχην*.  
 560, 5 from the bottom, for *Definia* read *Definat*.  
 Page 618, line 19 to 22, dele "Owing perhaps to the great quantity of fixed air which becomes disengaged when the latter is dissolved in the stomach by the Gastric Acid."

*It is hoped that the authors of the several papers in this volume will excuse these, and some other small typographical errors not noticed, which have been occasioned by the distance of the editors from the press.*



